DAIKIN

ESiEN09-05

Service Manual

ERQ Condensing Unit Single Phase

ERQ 100/125/140 A7V1B (outdoor unit)
EKEQD/F/MCBV3 (control box)
EKEXV 50/63/80/100/125/140 (expansion valve kit)

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1. Introduction

1.1 Safety Cautions

Cautions and Warnings

- Be sure to read the following safety cautions before conducting repair work.
- The caution items are classified into "⚠ **Warning**" and "⚠ **Caution**". The "⚠ **Warning**" items are especially important since they can lead to death or serious injury if they are not followed closely. The "⚠ **Caution**" items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.
- About the pictograms

△ This symbol indicates an item for which caution must be exercised.
The pictogram shows the item to which attention must be paid.

◯ This symbol indicates a prohibited action.
The prohibited item or action is shown inside or near the symbol.

● This symbol indicates an action that must be taken, or an instruction.
The instruction is shown inside or near the symbol.

- After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer

1.1.1 Caution in Repair

⚠ Warning	
Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair. Working on the equipment that is connected to a power supply can cause an electrical shook. If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment.	
If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas. The refrigerant gas can cause frostbite.	
When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first. If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.	
If the refrigerant gas leaks during the repair work, ventilate the area. The refrigerant gas can generate toxic gases when it contacts flames.	
The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit. Be sure to discharge the capacitor completely before conducting repair work. A charged capacitor can cause an electrical shock.	
Do not start or stop the air conditioner operation by plugging or unplugging the power cable plug. Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.	

Caution	
Do not repair the electrical components with wet hands. Working on the equipment with wet hands can cause an electrical shock.	
Do not clean the air conditioner by splashing water. Washing the unit with water can cause an electrical shock.	
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	
Be sure to turn off the power switch and unplug the power cable when cleaning the equipment. The internal fan rotates at a high speed, and cause injury.	
Do not tilt the unit when removing it. The water inside the unit can spill and wet the furniture and floor.	
Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work. Working on the unit when the refrigerating cycle section is hot can cause burns.	
Use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	

1.1.2 Cautions Regarding Products after Repair

Warning	
Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.	
When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.	
Be sure to install the product correctly by using the provided standard installation frame. Incorrect use of the installation frame and improper installation can cause the equipment to fall, resulting in injury.	For integral units only
Be sure to install the product securely in the installation frame mounted on a window frame. If the unit is not securely mounted, it can fall and cause injury.	For integral units only
Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work. Insufficient power circuit capacity and improper electrical work can cause an electrical shock or fire.	

Warning	
Be sure to use the specified cable to connect between the AHU and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals. Improper connections can cause excessive heat generation or fire.	
When connecting the cable between the AHU and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable. If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.	
Do not damage or modify the power cable. Damaged or modified power cable can cause an electrical shock or fire. Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.	
Do not mix air or gas other than the specified refrigerant (R-410A) in the refrigerant system. If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.	
If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak. If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.	
When replacing the coin battery in the remote control, be sure to disposed of the old battery to prevent children from swallowing it. If a child swallows the coin battery, see a doctor immediately.	

Caution	
Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.	
Do not install the equipment in a place where there is a possibility of combustible gas leaks. If a combustible gas leaks and remains around the unit, it can cause a fire.	
Be sure to install the packing and seal on the installation frame properly. If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.	For integral units only

1.1.3 Inspection after Repair

Warning	
Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way. If the plug has dust or loose connection, it can cause an electrical shock or fire.	
If the power cable and lead wires have scratches or deteriorated, be sure to replace them. Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.	
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.	

Caution	
Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections can cause excessive heat generation, fire or an electrical shock.	
If the installation platform or frame has corroded, replace it. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	
Check the grounding, and repair it if the equipment is not properly grounded. Improper grounding can cause an electrical shock.	
Be sure to measure the insulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher. Faulty insulation can cause an electrical shock.	
Be sure to check the drainage of the AHU after the repair. Faulty drainage can cause the water to enter the room and wet the furniture and floor.	

1.1.4 Using Icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

1.1.5 Using Icons List

Icon	Type of Information	Description
Note:	Note	A “note” provides information that is not indispensable, but may nevertheless be valuable to the reader, such as tips and tricks.
Caution	Caution	A “caution” is used when there is danger that the reader, through incorrect manipulation, may damage equipment, loose data, get an unexpected result or has to restart (part of) a procedure.
Warning	Warning	A “warning” is used when there is danger of personal injury.
	Reference	A “reference” guides the reader to other places in this binder or in this manual, where he/she will find additional information on a specific topic.

Part 1
General Information

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1. Model Names of Outdoor Units, Control Box and Expansion Valve Kit

1.1 Outdoor Units

Outlook

Model name

Series			Model Name			Power Supply
Inverter	Heat Pump	ERQ	100A	125A	140A	V1 B

V1: 1ϕ, 220~240V, 50Hz

1.2 Control Box

Outlook

Types

We distinguish 3 types of control boxes:

- EKEQD: Z-control
- EKEQF: X,Y-control
- EKEQM: Z-control (only with VRV outdoor unit, no ERQ)

Control type X
Control of air temperature (T_d, T_s or T_r) by means of external device (DDC controller).
Control type Y
Control of evaporation and condensing temperature (T_e, T_c) by Daikin control (no DDC needed).
Control type Z
Control of air temperature (T_s or T_r) by Daikin control (no DDC needed).

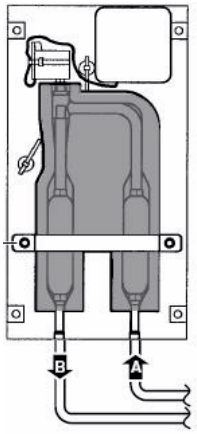
Legend:

T_d	Discharge air control
T_s	Suction air control
T_r	Room air control
T_e	Evaporating temperature control
T_c	Condensing temperature control
AHU	Air handling unit
DDC	Digital controller

1.3 Expansion Valve Kit

Outlook

Expansion valve kit installation drawing:



Model name

Limits for outdoor unit (expansion valve kit).

Outdoor unit (class)	EKEXV kit
100	EKEXV63~125
125	EKEXV63~140
140	EKEXV80~140

Depending on the heat exchanger, a connectable EKEXV (expansion valve kit) must be selected to these limitations.

	Allowed heat exchanger volume (dm^3)		Allowed heat exchanger capacity (kW)	
EKEXV class	Minimum	Maximum	Minimum	Maximum
63	1.66	2.08	6.3	7.8
80	2.09	2.64	7.9	9.9
100	2.65	3.30	10.0	12.3
125	3.31	4.12	12.4	15.4
140	4.13	4.62	15.5	17.6

Saturated suction temperature (SST) = 6°C, SH (superheat) = 5 K, air temperature = 27°C DB / 19°C WB.

2. Combination Table

		Control box		Expansion valve kit				
Outdoor unit		EKEQDCBV3	EKEQFCBV3	EKEXV63	EKEXV80	EKEXV100	EKEXV125	EKEXV140
single phase	ERQ100	P	P	P	P	P	P	-
	ERQ125	P	P	P	P	P	P	P
	ERQ140	P	P	-	P	P	P	P

Heat pump

P: Pair: Combination depending on AHU heat exchanger volume and capacity.

	Allowed heat exchanger volume (dm^3)		Allowed heat exchanger capacity (kW)	
EKEXV class	Minimum	Maximum	Minimum	Maximum
63	1.66	2.08	6.3	7.8
80	2.09	2.64	7.9	9.9
100	2.65	3.3	10	12.3
125	3.31	4.12	12.4	15.4
140	4.13	4.62	15.5	17.6

Saturated suction temperature (SST) = 6°C, SH (superheat) = 5 K, air temperature = 27°C DB / 19°C WB.

Note: If conflicting result occurs, capacity selection has priority over volume.

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Specifications

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1. Specifications

1.1 Outdoor Units

Heat Pump 50Hz ERQ 100/125/140 A7V1B

TECHNICAL SPECIFICATIONS				ERQ100A7V1B	ERQ125A7V1B	ERQ140A7V1B
Nominal capacity	Cooling		kW	11,2	14,0	15,5
	Heating		kW	12,5	16,0	18,0
EER	Cooling			3,99	3,99	3,42
COP	Heating			4,56	4,15	3,94
Capacity range			HP	4	5	6
PED category				Category I		
Casing	Colour			Daikin white		
	Material			Painted galvanised steel		
Dimensions	Packing	Height	mm	1524	1524	1524
		Width	mm	980	980	980
		Depth	mm	420	420	420
	Unit	Height	mm	1345	1345	1345
		Width	mm	900	900	900
		Depth	mm	320	320	320
Weight	Unit		kg	120	120	120
	Packed unit		kg	130	130	130
Packing	Material			Carton + wood + EPS		
	Weight		kg	8	8	8
Heat exchanger	Specifications	Length	mm	857	857	857
		Nr of rows		2	2	2
		Fin pitch	mm	2	2	2
		Nr of passes		10	10	10
		Face area	m²	1131	1131	1131
		Nr of stages		60	60	60
		Empty tubeplate hole		0	0	0
	Tube type			Hi-XSS (8)		
	Fin	Fin type		Non-symmetric waffle louvre		
		Treatment		Corrosion resistant		
Fan	Type			Propeller		
	Quantity			2	2	2
	Air flow rate (nominal at rated voltage)	Cooling	m³/min	106	106	106
		Heating	m³/min	102	105	105
	Discharge direction			Horizontal		
	Motor	Quantity		2	2	2
		Model		Brushless DC motor		
	Speed (nominal)	Cooling	rpm	850/815	850/815	850/815
		Heating	rpm	820/785	840/805	840/805
		Drive		Direct drive		
		Output	W	70	70	70
Compressor	Quantity			1	1	1
	Motor	Quantity		1	1	1
		Model		JT100G-VDL		
		Type		Hermetically sealed scroll compressor		
		Speed	rpm	6480	6480	6480
		Motor output	kW	2.5	3.0	3.5
		Starting method		Direct on line		
		Crankcase heater	W	33	33	33
Operation range	Cooling	Min	°CDB	-5	-5	-5
		Max	°CDB	46	46	46
	Heating	Min	°CWB	-20	-20	-20
		Max	°CWB	15.5	15.5	15.5
Sound level (nominal)	Cooling	Sound power	dBA	66	67	69
		Sound pressure	dBA	50	51	53
	Heating	Sound pressure	dBA	52	53	55
Refrigerant	Type			R-410A		
	Charge		kg	4.0	4.0	4.0
	Control			Expansion valve (electronic type)		
	Nr of circuits			1	1	1

TECHNICAL SPECIFICATIONS				ERQ100A7V1B	ERQ125A7V1B	ERQ140A7V1B
Refrigerant oil	Type			Daphne FVC68D		
	Charged volume		l	1.5	1.5	1.5
Piping connections	Liquid	Type		Flare connection	Flare connection	Flare connection
		Diameter (OD)	mm	9.52	9.52	9.52
	Gas	Type		Flare connection	Flare connection	Braze connection
		Diameter (OD)	mm	15.9	15.9	19.1
	Drain	Quantity		3	3	3
		Diameter (OD)	mm	26 × 3	26 × 3	26 × 3
	Heat insulation			Both liquid and gas pipes		
	Max total length		m	55	55	55
Defrost method				Reversed cycle		
Defrost control				Sensor for outdoor heat exchanger temperature		
Capacity control method				Inverter controlled		
Capacity control [%]				24 to 100		
Safety devices				HPS		
Safety devices				Fan motor thermal protection		
Safety devices				Inverter overload protector		
Safety devices				PC board fuse		
Standard accessories	Item			Installation manual		
	Quantity			1	1	1
Standard accessories	Item			Operation manual		
	Quantity			1	1	1
Standard accessories	Item					Connection pipes
	Quantity					3
Notes				Nominal cooling capacities are based on: indoor temperature: 27°CDB/19°CWB, outdoor temperature: 35°CDB, equivalent refrigerant piping: 7,5m, level difference: 0m.		
				Nominal heating capacities are based on: indoor temperature: 20°CDB, outdoor temperature: 7°CDB/6°CWB, equivalent refrigerant piping: 7,5m, level difference: 0m.		
				Sound pressure level is a relative value, depending on the distance and acoustic environment. For more details, please refer to sound level drawings.		
				Sound values are measured in a semi-anechoic room.		

ELECTRICAL SPECIFICATIONS				ERQ100A7V1B	ERQ125A7V1B	ERQ140A7V1B
Power supply	Name			V1		
	Phase			1N~		
	Frequency		Hz	50		
	Voltage		V	220-240		
Current	Nominal running current in cooling (RLA)		A	15,9	20,2	22,2
	Starting current (MSC)		A	15,9	20,2	22,2
	Zmax		Ω	No requirements		
	Minimum Ssc (2) value		kVA	Equipment complying with EN/IEC 61000-3-12 (1)		
	Maximum running current (RLA)		A	27,0		
	Min circuit amps (MCA)		A	27,0		
	Max fuse amps (MFA)		A	32,0		
	Full load amps (FLA)		A	0,3 + 0,3 (Fan motor)		
Voltage range	Minimum		V	198		
	Maximum		V	264		
Wiring connections	For power supply	Quantity		3		
		Remark		Earth wire included		
	For connection with AHU	Quantity		2		
		Remark		F1 + F2		
Power supply intake				Both AHU and outdoor unit		
Field earth leakage breaker			mA	300		

Notes (1) European/international technical standard setting the limits for harmonic currents produced by equipment connected to public low voltage system with input current > 16A and ≤ 75A per phase.

(2) Short-circuit power.

Symbols:

MCA	Minimum Circuit Amps
MFA	Maximum Fuse Amps (see note 5)
RLA	Rated Load Amps
FLA	Full Load Amps
MSC	Starting Current (see note 6)

Notes:

1 RLA based on the following conditions
- Indoor temperature 27°CDB/19°CWB
- Outdoor temperature 35°CDB

2 Voltage range
Units are suitable for use on electrical systems where the voltage supplied to the unit terminals is not below or above the listed range limits.

3 Maximum allowable voltage unbalance between phases is 2%.

4 Select wire size based on MCA.

5 Instead of fuse, use circuit breaker. MFA is used to select circuit breaker and the ground fault circuit interrupter (earth leakage circuit breaker).

6 MSC means the maximum current during start up of the compressor.

1.2 Air Handling Units

Field supply, ask manufacturer.

Part 3
List of Electrical and Functional Parts

1. List of Electrical and Functional Parts 14
1.1 Outdoor Unit 14

1. List of Electrical and Functional Parts

1.1 Outdoor Unit

ERQ 100/125/140 A7V1B

Item	Name		Symbol	Model			Remark (PCB terminal)
				4HP	5HP	6HP	
Compressor	Inverter	Type	M1C	JT100G-VDL			Relay
		Output		2.5kW	3.0kW	3.5kW	A1P
	Crankcase heater (INV)		E1HC	33W			A1P X28A
Fan motor	Motor		M1F·M2F	0.07kW			—
	Over-current relay		—	3.2A			—
Functional parts	Electronic expansion valve (Main)	Cooling	Y1E	480pls			A1P X21A
		Heating		PI control			
	Electronic expansion valve (Subcool)	Cooling	Y3E	PI control			A1P X22A
		Heating		PI control			
	4 way valve		Y1S	STF-0404G			A1P X25A
	Solenoid valve (Hot gas)		Y2S	TEV1620DQ2			A1P X26A
	Solenoid valve (Unload circuit)		Y3S	TEV1620DQ2			A1P X27A
Pressure-related parts	Pressure switch (INV)		S1PH	ACB-4UB10 OFF: 4.0+0/-0.15MPa ON: 3.0±0.15MPa			A1P X32A
	Pressure sensor (HP)		S1NPH	PS8051A 0~4.15MPa			A1P X17A
	Pressure sensor (LP)		S1NPL	PS8051A –0.05~1.7MPa			A1P X18A
Thermistor	Main PCB	For outdoor air	R1T	3.5~360kΩ			A1P X11A
		For discharge pipe	R2T	5.0~640kΩ			A1P X12A 1-2Pin
		For suction pipe 1	R3T	3.5~360kΩ			A1P X12A 3-4Pin
		For heat exchanger	R4T	3.5~360kΩ			A1P X12A 5-6Pin
		For suction pipe 2	R5T	3.5~360kΩ			A1P X12A 7-8Pin
		For subcooling heat exchanger	R6T	3.5~360kΩ			A1P X13A 1-2Pin
		For liquid pipe 1	R7T	3.5~360kΩ			A1P X13A 3-4Pin
		For liquid pipe 2	R8T	3.5~360kΩ			A1P X13A 5-6Pin
Others	Fuse (A1P)		F1U	AC250V 6.3A Time lag fuse			—

Part 4
Refrigerant Circuit

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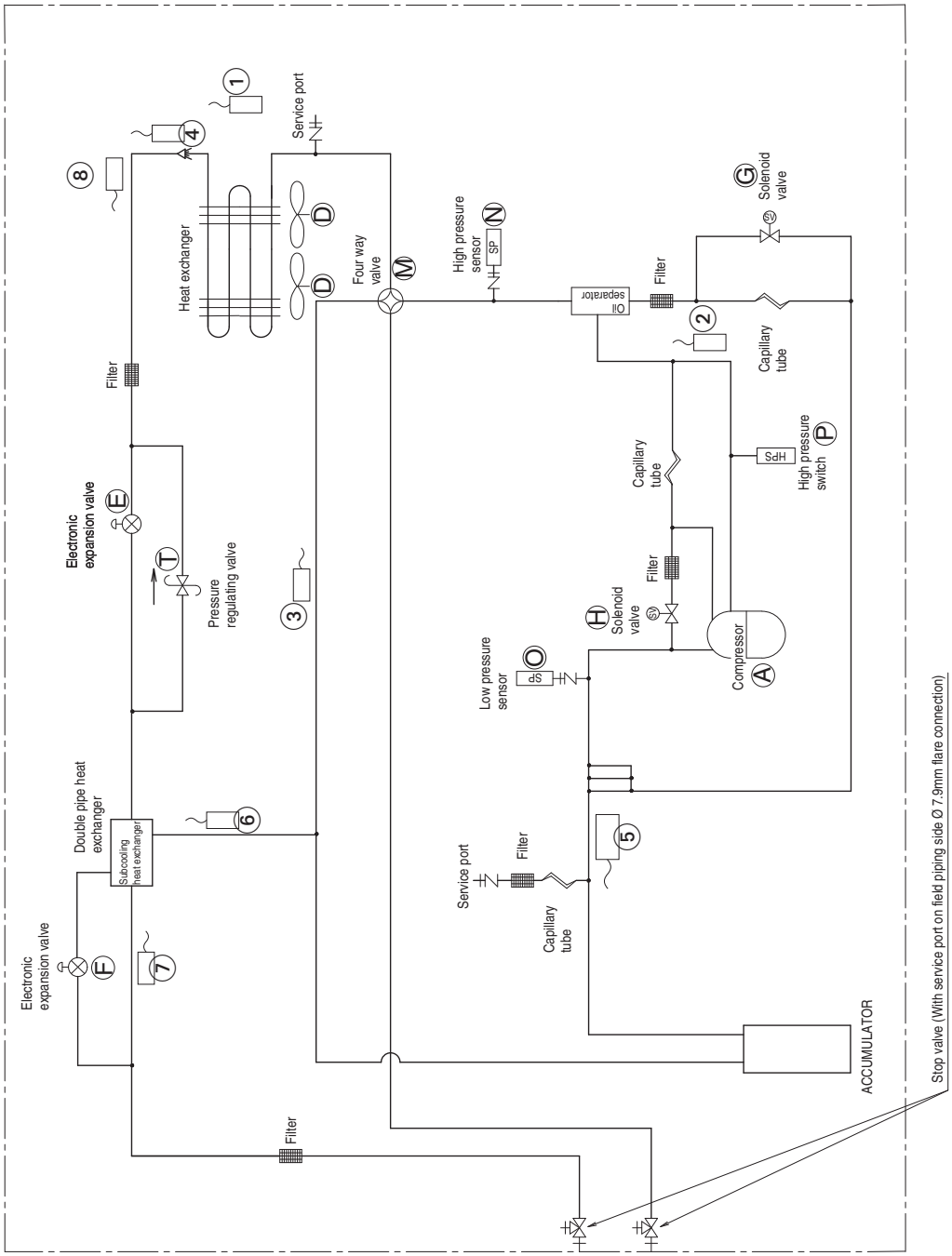
1. Refrigerant Circuit

1.1 Outdoor Unit

ERQ 100/125/140 A7V1B

No. in refrigerant system diagram	Symbol	Name	Major Function
A	M1C	Inverter compressor (INV)	Inverter compressor is operated on frequencies between 36 Hz and 195 Hz by using the inverter. 31 steps
D	M1F M2F	Inverter fan	Since the system is of air heat exchanging type, the fan is operated at 8-step rotation speed by using the inverter.
E	Y1E	Electronic expansion valve (Main: EV1)	While in heating operation, PI control is applied to keep the outlet superheated degree of air heat exchanger constant.
F	Y3E	Electronic expansion valve (Subcool: EV3)	PI control is applied to keep the outlet superheated degree of subcooling heat exchanger constant.
G	Y2S	Solenoid valve (Hot gas: SVP)	Used to prevent the low pressure from transient falling.
H	Y3S	Solenoid valve (Unload circuit SVUL)	Used to the unloading operation of compressor.
M	Y1S	Four way valve	Used to switch the operation mode between cooling and heating.
N	S1NPH	High pressure sensor	Used to detect high pressure.
O	S1NPL	Low pressure sensor	Used to detect low pressure.
P	S1PH	HP pressure switch (For INV compressor)	In order to prevent the increase of high pressure when a malfunction occurs, this switch is activated at high pressure of 4.0 MPa or more to stop the compressor operation.
T	—	Pressure regulating valve 1 (Receiver to discharge pipe)	This valve opens at a pressure of 4.0 MPa for prevention of pressure increase, thus resulting in no damage of functional parts due to the increase of pressure in transportation or storage.
1	R1T	Thermistor (Outdoor air: Ta)	Used to detect outdoor temperature, correct discharge pipe temperature, and others.
2	R2T	Thermistor (INV discharge pipe: Tdi)	used to detect discharge pipe temperature, make the temperature protection control of compressor, and others.
3	R3T	Thermistor (Suction pipe1: Ts1)	used to detect suction pipe temperature, keep the suction superheated degree constant in heating operation, and others.
4	R4T	Thermistor (Heat exchanger deicer: Tb)	Used to detect liquid pipe temperature of air heat exchanger, determine defrosting operation, and others.
5	R5T	Thermistor (Suction pipe2: Ts2)	Used to the calculation of an internal temperature of compressor etc.
6	R6T	Thermistor (Subcooling heat exchanger gas pipe: Tsh)	Used to control of subcooling electronic expansion valve.
7	R7T	Thermistor (Liquid pipe1: Tl1)	Used to detect refrigerant over charge in check operation, and others.
8	R8T	Thermistor (Liquid pipe2: Tl2)	Used to detect refrigerant over charge in check operation, and others.

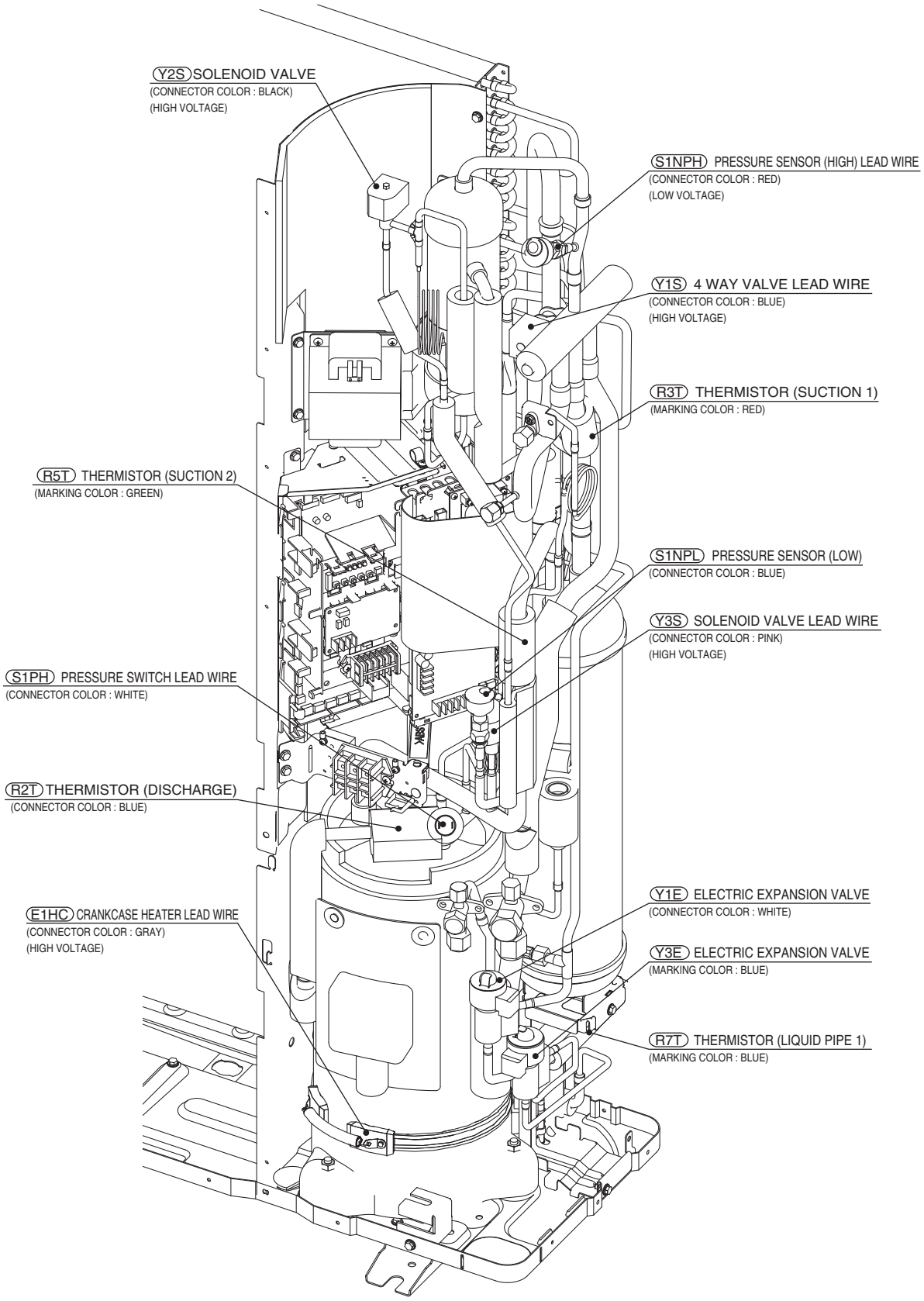

Service port
Heat exchanger
Four way valve
High pressure sensor
Solenoid valve
Oil separator
Filter
Capillary tube
High pressure switch
HPS
Electronic expansion valve
Pressure regulating valve
Solenoid valve
Compressor
Low pressure sensor
Double pipe heat exchanger
Subcooling heat exchanger
Electronic expansion valve
Capillary tube
ACCUMULATOR
Stop valve (With service port on field piping side Ø 7.9mm flare connection)

C : 3D052712

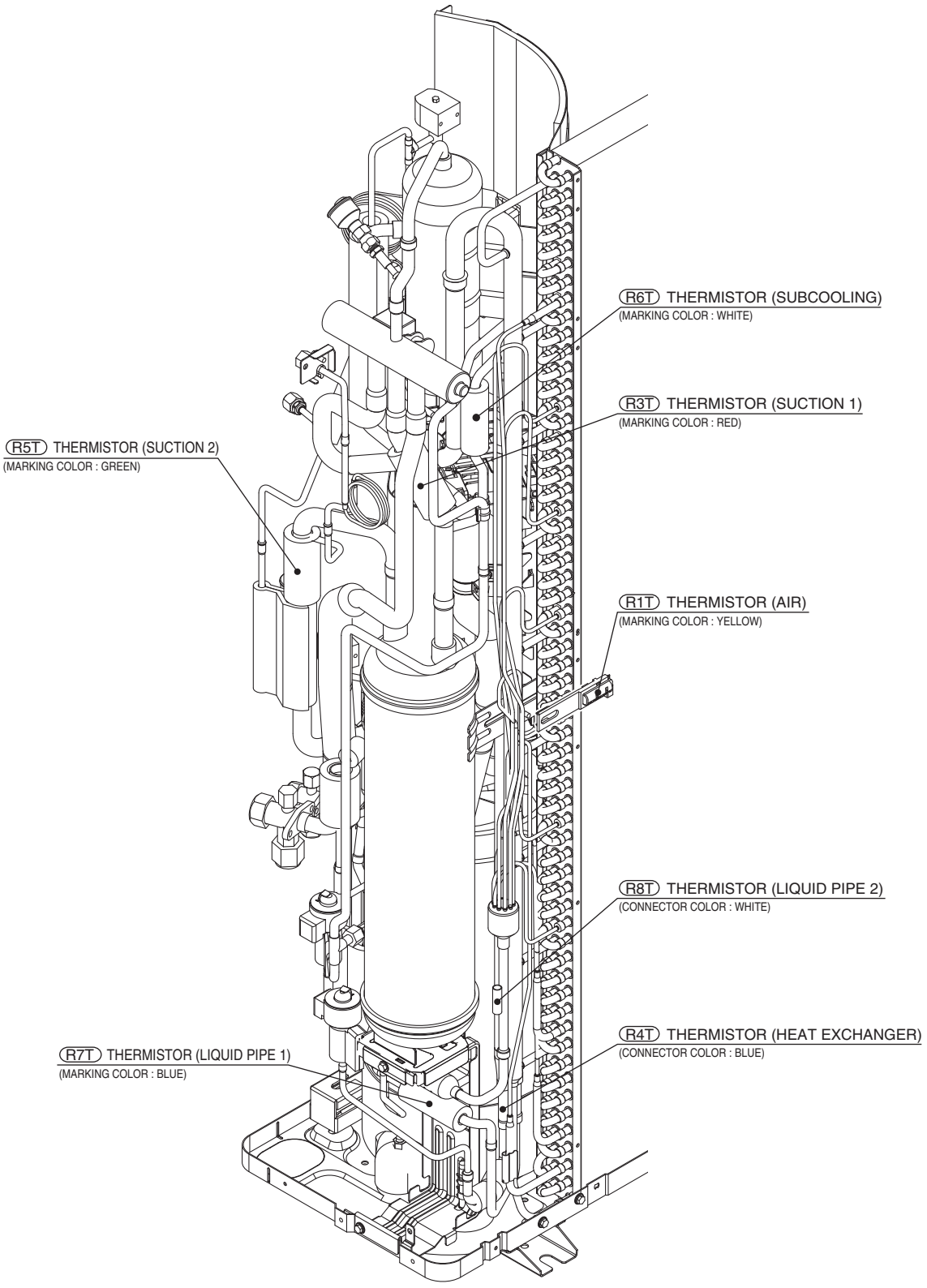
2. Functional Parts Layout

2.1 ERQ 100/125/140 A7V1B

Birds-eye view



Back view


R6T THERMISTOR (SUBCOOLING)
(MARKING COLOR : WHITE)
R3T THERMISTOR (SUCTION 1)
(MARKING COLOR : RED)
R5T THERMISTOR (SUCTION 2)
(MARKING COLOR : GREEN)
R1T THERMISTOR (AIR)
(MARKING COLOR : YELLOW)
R8T THERMISTOR (LIQUID PIPE 2)
(CONNECTOR COLOR : WHITE)
R4T THERMISTOR (HEAT EXCHANGER)
(CONNECTOR COLOR : BLUE)
R7T THERMISTOR (LIQUID PIPE 1)
(MARKING COLOR : BLUE)

Part 5
Function

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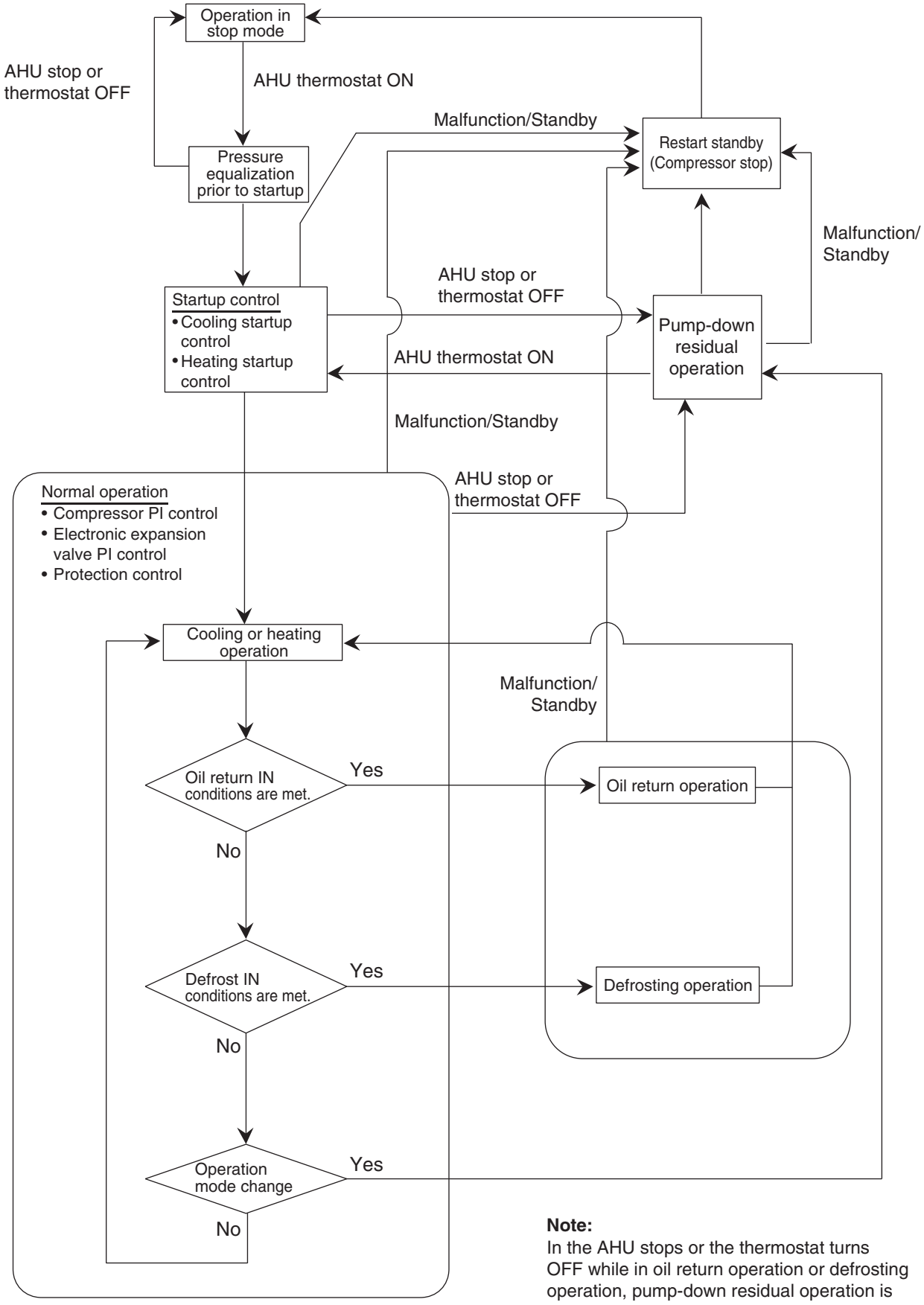
1. Operation Mode



Note:
In the AHU stops or the thermostat turns OFF while in oil return operation or defrosting operation, pump-down residual operation is performed on completion of the oil return operation or defrosting operation.

(V3152)

2. Basic Control

2.1 Normal Operation

■ **Cooling Operation**

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Outdoor unit fan	Cooling fan control	—
Four way valve	OFF	—
Main electronic expansion valve (EV1)	480 pls	—
Subcooling electronic expansion valve (EV3)	PI control	—
Hot gas bypass valve (SVP)	OFF	This valve turns on with low pressure protection control.

■ **Heating Operation**

Actuator	Operation	Remarks
Compressor	Compressor PI control	Used for high pressure protection control, low pressure protection control, discharge pipe temperature protection control, and compressor operating frequency upper limit control with inverter protection control.
Outdoor unit fan	STEP 7 or 8	—
Four way valve	ON	—
Main electronic expansion valve (EV1)	PI control	—
Subcooling electronic expansion valve (EV3)	PI control	—
Hot gas bypass valve (SVP)	OFF	This valve turns on with low pressure protection control.

★Heating operation is not functional at an outdoor air temperature of 24°CDB or more.

2.2 Compressor PI Control

2.2.1 For Z-Control

Carries out the compressor capacity PI control to maintain Te at constant during cooling operation and Tc at constant during heating operation to ensure stable unit performance.

[Cooling operation]

Controls compressor capacity to adjust Te to achieve target value (TeS).

Te : Low pressure equivalent saturation temperature (°C)

Te setting (Set in Set-up mode 2)

L	M (Normal) (factory setting)	H
3	6	9

TeS : Target Te value
(Varies depending on Te setting, operating frequency, etc.)

[Heating operation]

Controls compressor capacity to adjust Tc to achieve target value (TcS).

Tc : High pressure equivalent saturation temperature (°C)

Tc setting

L	M (Normal) (factory setting)	H
43	46	49

TcS : Target Tc value
(Varies depending on Tc setting, operating frequency, etc.)

2.2.2 For X-, Y-Control

For T_e, T_c: see field settings

2.2.3 Frequencies ERQ 100/125/140

STn	INV(Fullload)	INV(Unload)
1		36.0Hz
2		39.0Hz
3		43.0Hz
4		47.0Hz
5		52.0Hz
6	52.0Hz	57.0Hz
7	57.0Hz	64.0Hz
8	62.0Hz	71.0Hz
9	68.0Hz	78.0Hz
10	74.0Hz	

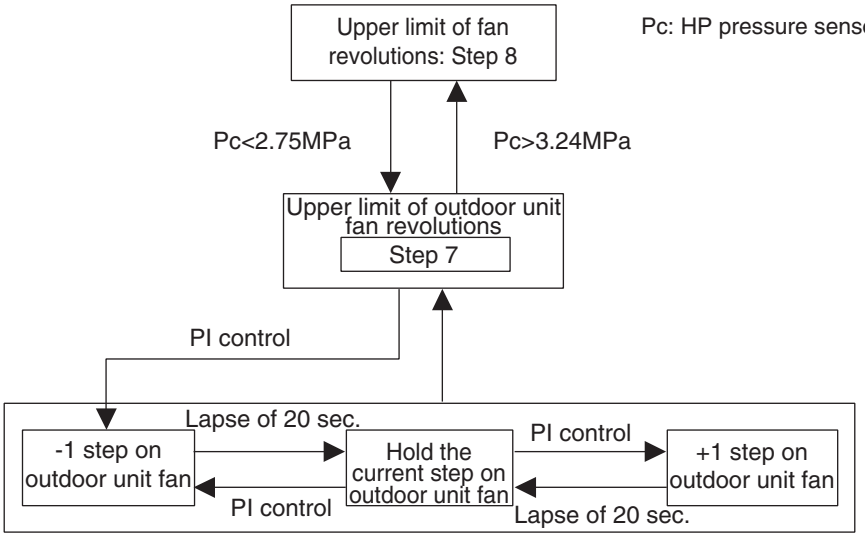
STn	INV(Fullload)	INV(Unload)
11	80.0Hz	
12	86.0Hz	
13	92.0Hz	
14	98.0Hz	
15	104.0Hz	
16	110.0Hz	
17	116.0Hz	
18	122.0Hz	
19	128.0Hz	
20	134.0Hz	

STn	INV(Fullload)	INV(Unload)
21	140.0Hz	
22	146.0Hz	
23	152.0Hz	
24	158.0Hz	
25	164.0Hz	
26	170.0Hz	
27	175.0Hz	
28	180.0Hz	
29	185.0Hz	
30	190.0Hz	
31	195.0Hz	

* Compressors may operate in a pattern other than those listed in above tables subject to the operating conditions. Selection of full load operation to/from unload operation is made with the unload circuit solenoid valve (Y3S=SVUL). The full load operation is performed with the SVUL set to OFF, while the unload operation is performed with the SVUL set to ON.

2.3 Cooling Operation Fan Control

In cooling operation with low outdoor air temperature, this control is used to provide the adequate amount of circulation air with liquid pressure secured by high pressure control using outdoor unit fan.
Furthermore, when outdoor temperature ≥ 20°C, the compressor will run in Step 7 or higher.
When outdoor temperature ≥ 18°C, it will run in Step 5 or higher.
When outdoor temperature ≥ 12°C, it will run in Step 1 or higher.


Upper limit of fan revolutions: Step 8
Pc: HP pressure sensor detection value
Pc<2.75MPa
Pc>3.24MPa
Upper limit of outdoor unit fan revolutions
Step 7
PI control
Lapse of 20 sec.
-1 step on outdoor unit fan
Hold the current step on outdoor unit fan
PI control
+1 step on outdoor unit fan
PI control
Lapse of 20 sec.

Fan Steps

Cooling	M1F	M2F
STEP0	0 rpm	0 rpm
STEP1	250 rpm	0 rpm
STEP2	400 rpm	0 rpm
STEP3	285 rpm	250 rpm
STEP4	360 rpm	325 rpm
STEP5	445 rpm	410 rpm
STEP6	580 rpm	545 rpm
STEP7	715 rpm	680 rpm
STEP8	850 rpm	815 rpm

3. Special Control

3.1 Startup Control

This control is used to equalize the pressure in the front and back of the compressor prior to the startup of the compressor, thus reducing startup loads. Furthermore, the inverter is turned ON to charge the capacitor.
In addition, to avoid stresses to the compressor due to oil return or else after the startup, the following control is made and the position of the four way valve is also determined. To position the four way valve, the master and slave units simultaneously start up.

3.1.1 Startup Control in Cooling Operation

Thermostat ON

	Pressure equalization control prior to startup	Startup control	
		STEP1	STEP2
Compressor	0 Hz	57 Hz Unload	57 Hz Unload +2 steps/20 sec. (until Pc - Pe>0.39MPa is achieved)
Outdoor unit fan	STEP7	Ta<20°C: OFF Ta≥20°C: STEP4	+1 step/15 sec. (when Pc>2.16MPa) -1 step/15 sec. (when Pc<1.77MPa)
Four way valve (20S1)	Holds	OFF	OFF
Main electronic expansion valve (EV1)	0 pls	480 pls	480 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	OR • Pc - Pe<0.3MPa • A lapse of 1 to 5 min.	A lapse of 10 sec.	OR • A lapse of 130 sec. • Pc - Pe>0.39MPa

3.1.2 Startup Control in Heating Operation

Thermostat ON

	Pressure equalization control prior to startup	Startup control	
		STEP1	STEP2
Compressor	0 Hz	57 Hz Unload	57 Hz Unload +2 steps/20 sec. (until Pc - Pe>0.39MPa is achieved)
Outdoor unit fan	From starting ~ 1 min. : STEP 7 1 ~ 3 min. : STEP 3 3 ~ 5 min. : OFF	STEP8	STEP8
Four way valve	Holds	ON	ON
Main electronic expansion valve (EV1)	0 pls	0 pls	0 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	OR • Pc - Pe<0.3MPa • A lapse of 1 to 5min.	A lapse of 10 sec.	OR • A lapse of 130 sec. • Pc>2.70MPa • Pc - Pe>0.39MPa

3.2 Oil Return Operation

In order to prevent the compressor from running out of oil, the oil return operation is conducted to recover oil flown out from the compressor to the system side.

3.2.1 Oil Return Operation in Cooling Operation

[Start conditions]

Referring to the set conditions for the following items, start the oil return operation in cooling.

- Cumulative oil feed rate
- Timer setting (Make this setting so as to start the oil return operation when the initial cumulative operating time reaches two hours after power supply is turned ON and then every eight hours.)

Furthermore, the cumulative oil feed rate is computed from Tc, Te, and compressor loads.

Outdoor unit actuator	Oil return preparation operation	Oil return operation	Post-oil-return operation
Compressor	Take the current step as the upper limit.	52 Hz Full load (→ Low pressure constant control)	Same as the “oil return operation” mode.
Outdoor unit fan	Fan control (Normal cooling)	Fan control (Normal cooling)	Fan control (Normal cooling)
Four way valve	OFF	OFF	OFF
Main electronic expansion valve (EV1)	480 pls	480 pls	480 pls
Subcooling electronic expansion valve (EV3)	SH control	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	20 sec.	or • 3 min. • Ts - Te<5°C	• 3 min. • Pe<0.6MPa • HTdi>110°C

AHU actuator		Cooling oil return operation
Fan	Thermostat ON unit	ON
	Stopping unit	OFF

3.2.2 Oil Return Operation in Heating Operation

[Conditions to start]

The heating oil-returning operation is started referring following conditions.

- Integrated amount of displaced oil
- Timer

  (After the power is turned on, integrated operating-time is 2 hours and subsequently every 8 hours.)

  In addition, integrated amount of displaced oil is derived from Tc, Te, and the compressor load.

Outdoor Unit Actuator	Oil return preparation operation	Oil return operation	Post-oil-return operation
Compressor	Upper limit control	140 Hz Full load	2-step increase from 36 Hz Unload to (Pc - Pe>0.4 MPa) every 20 sec.
Outdoor unit fan	STEP8	OFF	STEP8
Four way valve	ON	OFF	ON
Main electronic expansion valve (EV1)	SH control	480 pls	55 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF	OFF
Ending conditions	2 min.	or [• 12 min. &[• Ts1 - Te<5°C • Tb>11°C]	or [• 160 sec. • Pc - Pe>0.4MPa]

* From the preparing oil-returning operation to the oil-returning operation, and from the oil-returning operation to the operation after oil-returning, the compressor stops for 1 minute to reduce noise on changing of the four way valve.

AHU actuator		Heating oil return operation
Fan	Thermostat ON unit	Field setting
	Stopping unit	OFF

3.3 Defrosting Operation

The defrost operation is performed to solve frost on the outdoor unit heat exchanger when heating, and the heating capacity is recovered.

[Conditions to start]

The defrost operation is started referring following conditions.

- Outdoor heat exchanger heat transfer co-efficiency
- Temperature of heat-exchange (Tb)
- Timer (2 hours at the minimum)
  In addition, outdoor heat-exchange co-efficiency is derived from Tc, Te, and the compressor load.

Outdoor unit actuator	Defrost preparation operation	Defrost operation	Post Defrost operation
Compressor	Upper limit control	140 Hz Full load	2-step increase from 36 Hz Unload to (Pc - Pe>0.4 MPa) every 20 sec.
Outdoor unit fan	STEP8	OFF	STEP8
Four way valve	ON	OFF	ON
Main electronic expansion valve (EV1)	SH control	480 pls	55 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	ON	ON
Ending conditions	2 min.	or [• 15 min. &[• Tb>11°C • Ts1 - Te<5°C]	or [• 160 sec. • Pc - Pe>0.4MPa]

* From the preparing operation to the defrost operation, and from the defrost operation to the operation after defrost, the compressor stops for 1 minute to reduce noise on changing of the four way valve.

AHU actuator		Heating oil return operation
Fan	Thermostat ON unit	Field setting
	Stopping unit	OFF

3.4 Pump-down Residual Operation

When activating compressor, if the liquid refrigerant remains in the heat-exchanger, the liquid enters into the compressor and dilutes oil therein resulting in decrease of lubricity.
Therefore, the pump-down residual operation is performed to collect the refrigerant in the heat-exchanger when the compressor is down.

3.4.1 Pump-down Residual Operation in Cooling Operation

Actuator	Pump-down residual operation Step 1	Pump-down residual operation Step 2
Compressor	124 Hz Full load	52 Hz Full load
Outdoor unit fan	Fan control	Fan control
Four way valve	OFF	OFF
Main electronic expansion valve (EV1)	480 pls	240 pls
Subcooling electronic expansion valve (EV3)	0 pls	0 pls
Hot gas bypass valve (SVP)	OFF	OFF
Ending conditions	2 sec.	2 sec.

3.4.2 Pump-down Residual Operation in Heating Operation

Actuator	Pump-down residual operation
Compressor	124 Hz Full load
Outdoor unit fan	STEP7
Four way valve	ON
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	4 sec.

3.5 Restart Standby

Restart is stood by force to prevent frequent power-on/off and to equalize pressure in the refrigerant system.

Actuator	Operation
Compressor	OFF
Outdoor unit fan	Ta>30°C: STEP4 Ta≤ 30°C: OFF
Four way valve	Keep former condition.
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	2 min.

3.6 Stopping Operation

Operation of the actuator when the system is down, is cleared up.

3.6.1 When System is in Stop Mode

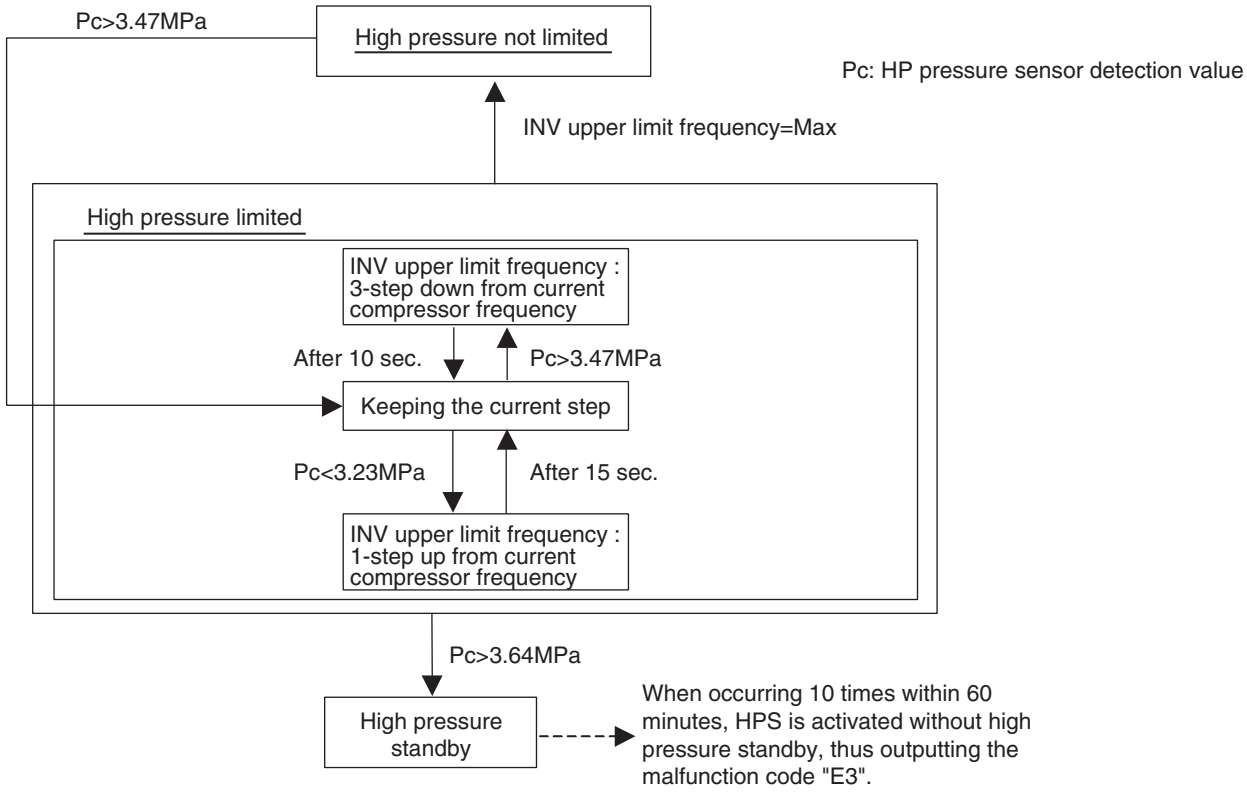
Actuator	Operation
Compressor	OFF
Outdoor unit fan	OFF
Four way valve	Keep former condition.
Main electronic expansion valve (EV1)	0 pls
Subcooling electronic expansion valve (EV3)	0 pls
Hot gas bypass valve (SVP)	OFF
Ending conditions	AHU thermostat is turned ON.

4. Protection Control

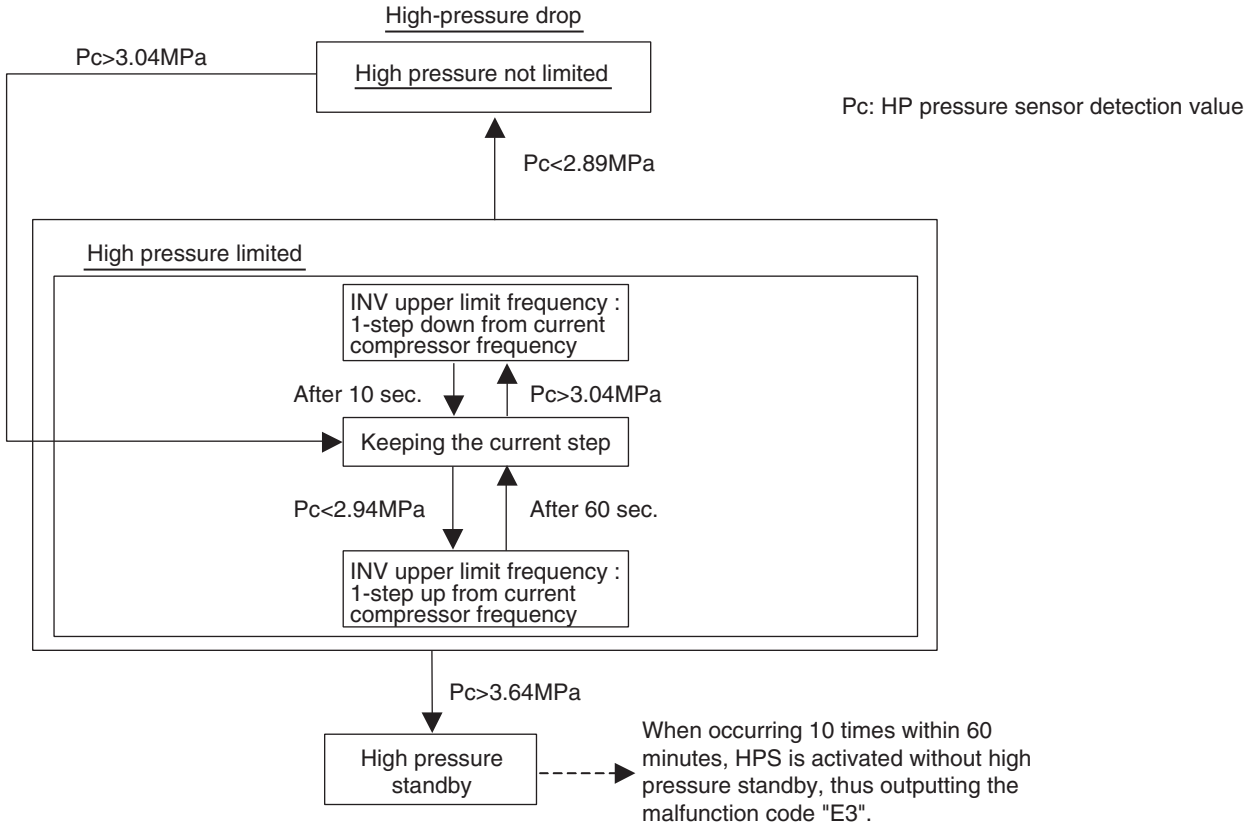
4.1 High Pressure Protection Control

This high pressure protection control is used to prevent the activation of protection devices due to abnormal increase of high pressure and to protect compressors against the transient increase of high pressure.

[In cooling operation]



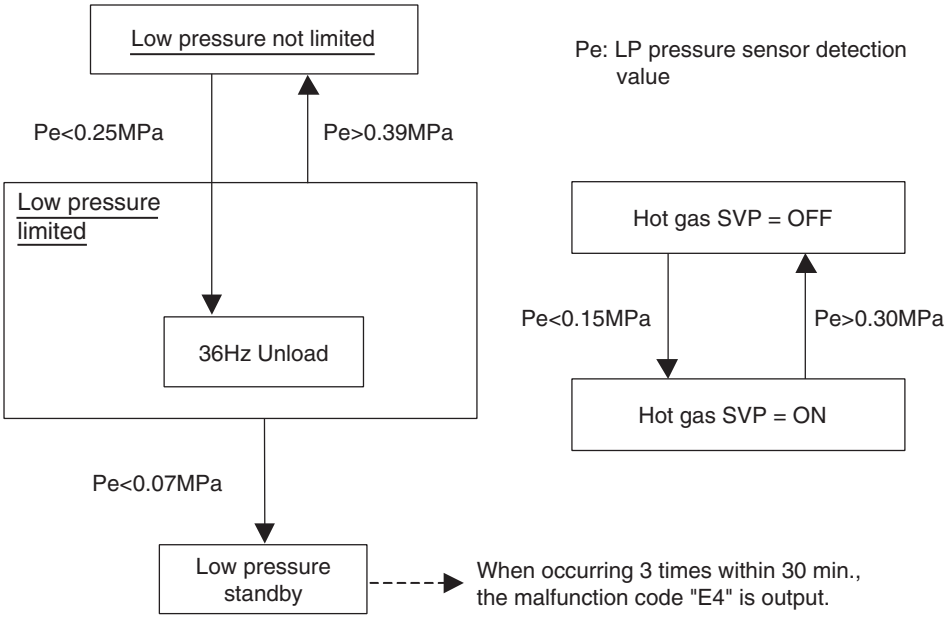
[In heating operation]



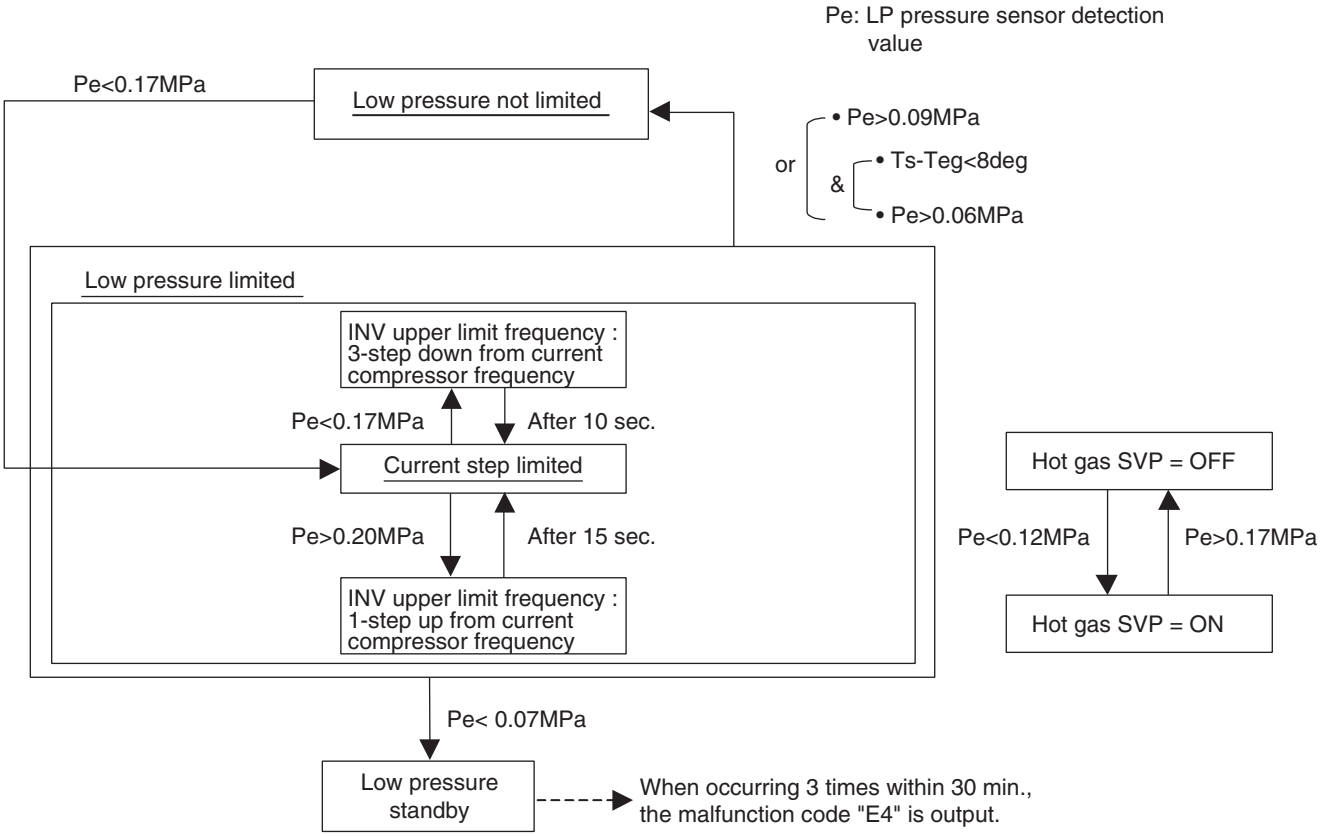
4.2 Low Pressure Protection Control

This low pressure protection control is used to protect compressors against the transient decrease of low pressure.

[In cooling operation]



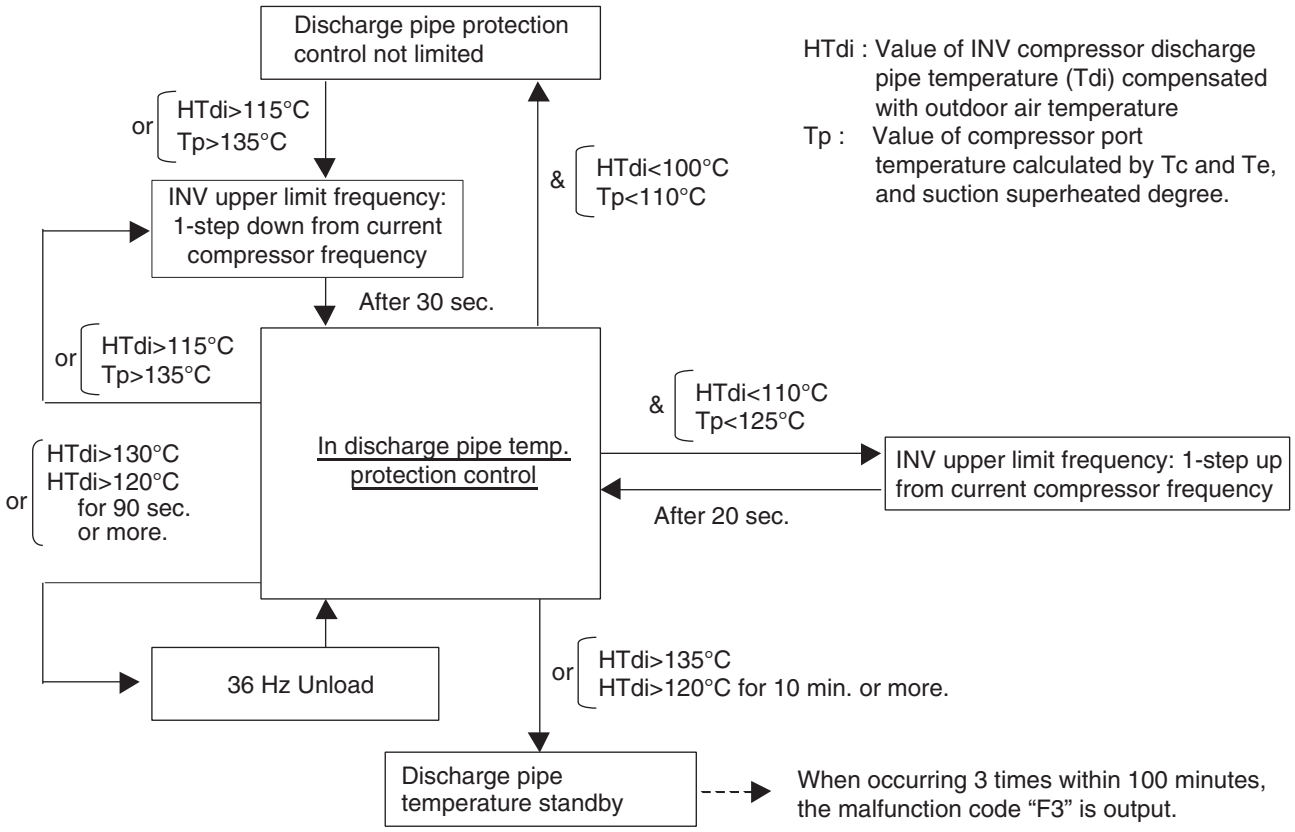
[In heating operation]



4.3 Discharge Pipe Protection Control

This discharge pipe protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.

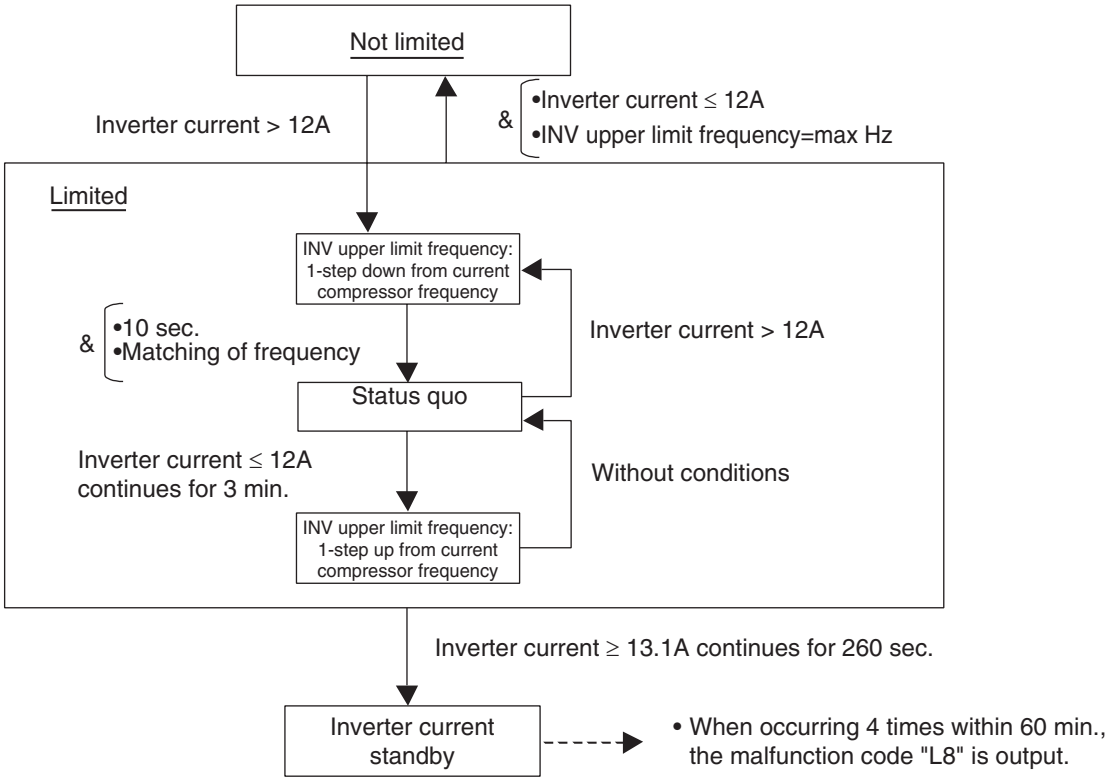
[INV compressor]



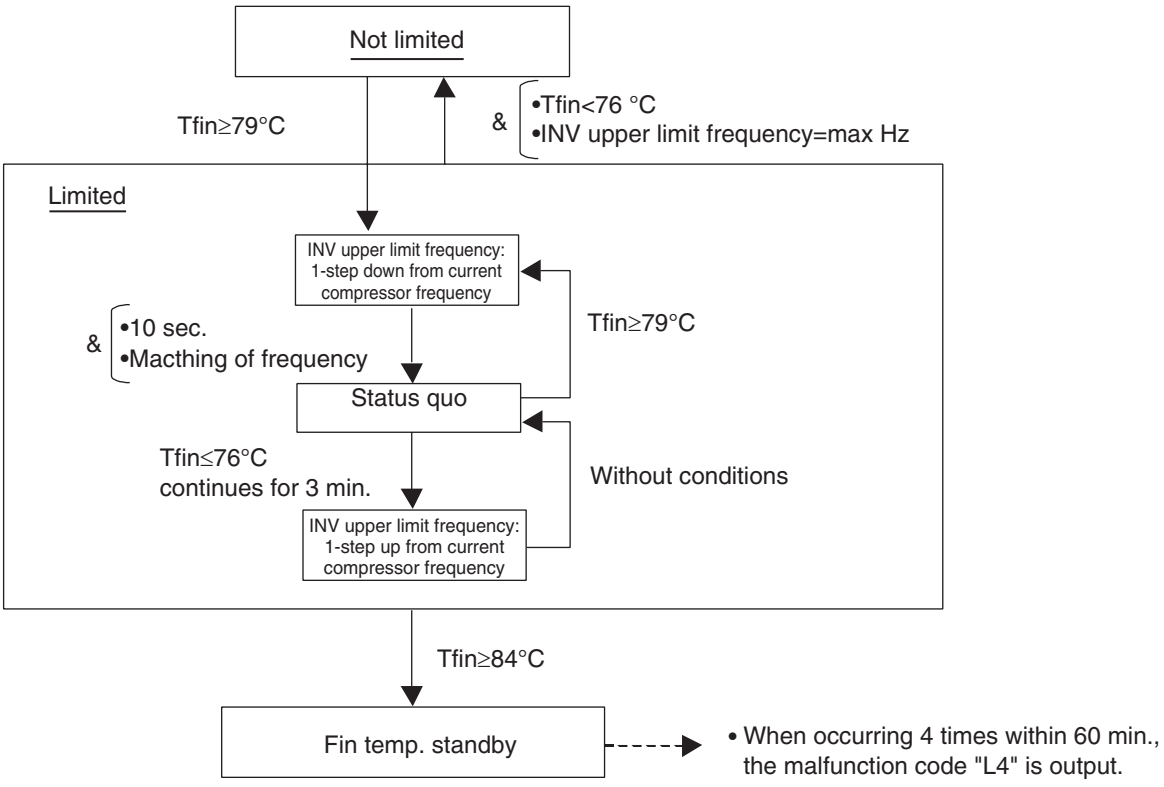
4.4 Inverter Protection Control

Inverter current protection control and inverter fin temperature control are performed to prevent tripping due to a malfunction, or transient inverter overcurrent, and fin temperature increase.

[Inverter overcurrent protection control]


Not limited
Inverter current > 12A
&
•Inverter current ≤ 12A
•INV upper limit frequency=max Hz
Limited
INV upper limit frequency: 1-step down from current compressor frequency
&
•10 sec.
•Matching of frequency
Inverter current > 12A
Status quo
Inverter current ≤ 12A continues for 3 min.
Without conditions
INV upper limit frequency: 1-step up from current compressor frequency
Inverter current ≥ 13.1A continues for 260 sec.
Inverter current standby
• When occurring 4 times within 60 min., the malfunction code "L8" is output.

[Inverter fin temperature control]



5. Other Control

5.1 Demand Operation

In order to save the power consumption, the capacity of outdoor unit is saved with control forcibly by using “Demand 1 Setting”.
To operate the unit with this mode, additional setting of “Continuous Demand Setting”.

[Demand 1 setting]

Setting	Standard for upper limit of power consumption
Demand 1 setting 1	Approx. 60%
Demand 1 setting 2 (factory setting)	Approx. 70%
Demand 1 setting 3	Approx. 80%

★ Other protection control functions have precedence over the above operation.

5.2 Heating Operation Prohibition

Heating operation is prohibited above 24°CDB outdoor air temperature.

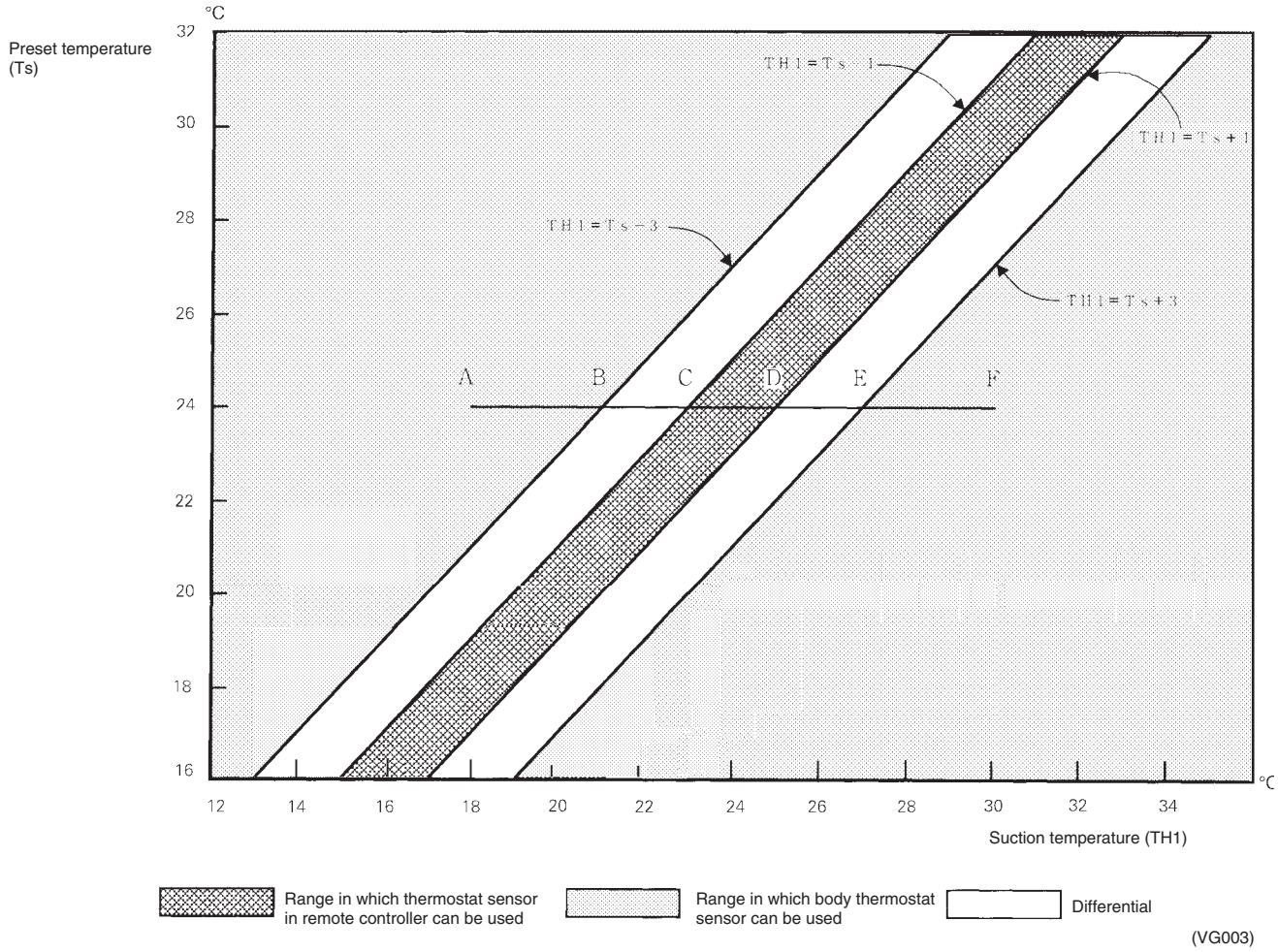
6. Outline of Control

6.1 Thermostat Sensor in remote control (only for Z-control)

Temperature is controlled by both the thermostat sensor in remote control and air suction thermostat in the AHU. (This is however limited to when the field setting for the thermostat sensor in remote control is set to “Use.”)

Cooling

If there is a significant difference in the preset temperature and the suction temperature, fine adjustment control is carried out using a body thermostat sensor, or using the sensor in the remote control near the position of the user when the suction temperature is near the preset temperature.



■ **Ex: When cooling**

Assuming the preset temperature in the figure above is 24°C, and the suction temperature has changed from 18°C to 30°C (A → F):

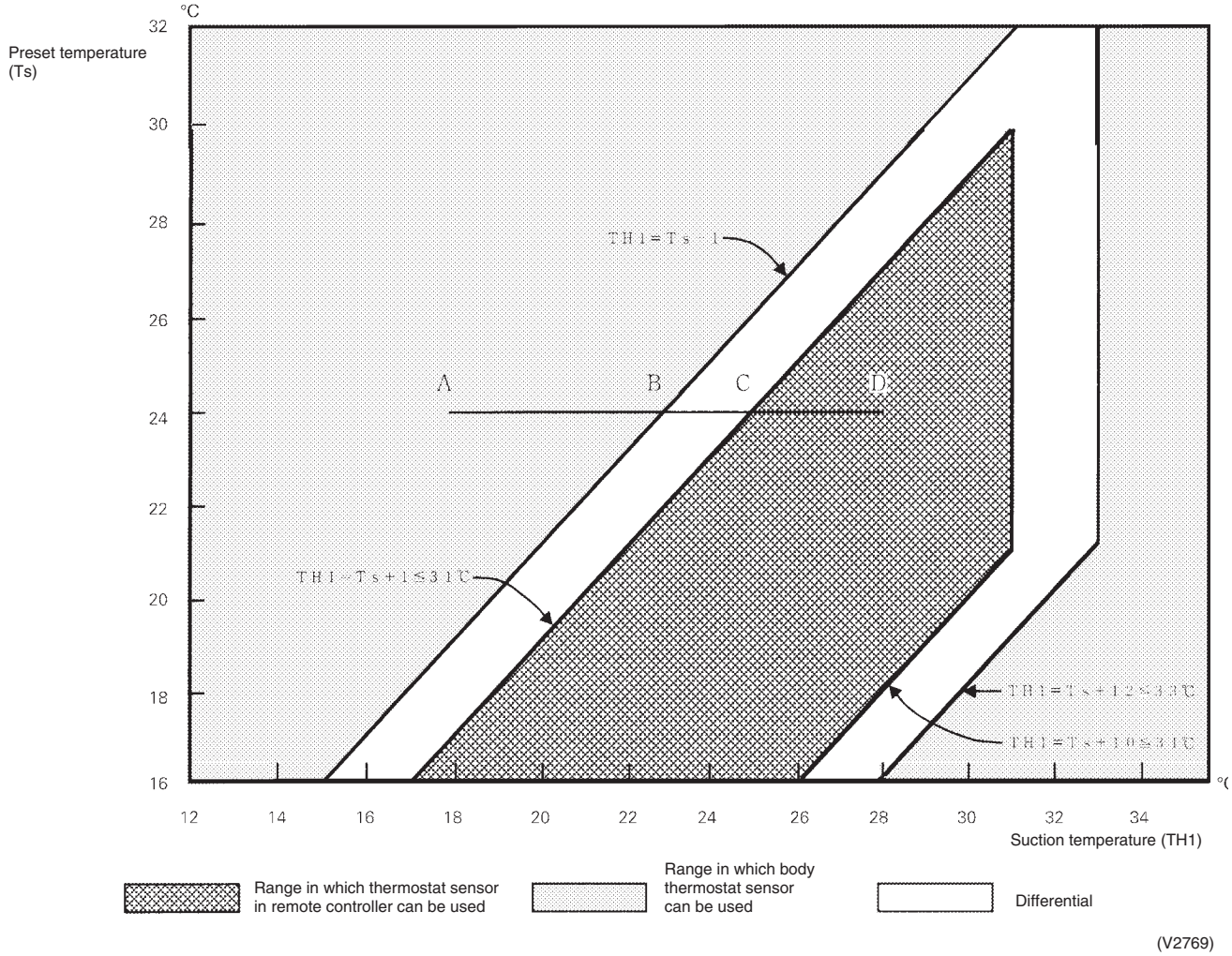
Body thermostat sensor is used for temperatures from 18°C to 23°C (A → C).
remote control thermostat sensor is used for temperatures from 23°C to 27°C (C → E).
Body thermostat sensor is used for temperatures from 27°C to 30°C (E → F).

And, assuming suction temperature has changed from 30°C to 18°C (F → A):

Body thermostat sensor is used for temperatures from 30°C to 25°C (F → D).
remote control thermostat sensor is used for temperatures from 25°C to 21°C (D → B).
Body thermostat sensor is used for temperatures from 21°C to 18°C (B → A).

Heating

When heating, the hot air rises to the top of the room, resulting in the temperature being lower near the floor where the occupants are. When controlling by body thermostat sensor only, the unit may therefore be turned off by the thermostat before the lower part of the room reaches the preset temperature. The temperature can be controlled so the lower part of the room where the occupants are doesn't become cold by widening the range in which thermostat sensor in remote control can be used so that suction temperature is higher than the preset temperature.



(V2769)

■ **Ex: When heating**

Assuming the preset temperature in the figure above is 24°C, and the suction temperature has changed from 18°C to 28°C (A → D):

Body thermostat sensor is used for temperatures from 18°C to 25°C (A → C).
remote control thermostat sensor is used for temperatures from 25°C to 28°C (C → D).

And, assuming suction temperature has changed from 28°C to 18°C (D → A):

remote control thermostat sensor is used for temperatures from 28°C to 23°C (D → B).
Body thermostat sensor is used for temperatures from 23°C to 18°C (B → A).

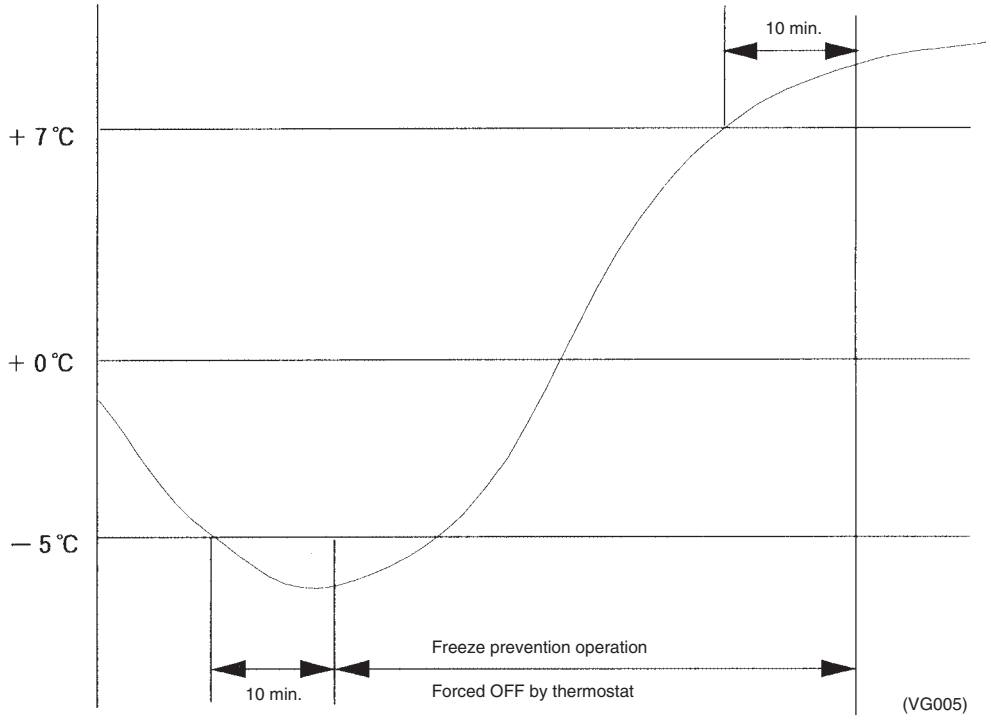
6.2 Freeze Prevention

Freeze Prevention by Off Cycle (AHU)

When the temperature detected by liquid pipe temperature thermistor (R2T) of the AHU heat exchanger drops too low, the unit enters freeze prevention operation in accordance with the following conditions, and is also set in accordance with the conditions given below.

Conditions for starting freeze prevention: Temperature is –1°C or less for total of 40 min., or temperature is –5°C or less for total of 10 min.
Conditions for stopping freeze prevention: Temperature is +7°C or more for 10 min. continuously

Ex: Case where temperature is –5°C or less for total of 10 min.



6.3 Hot Start Control (In Heating Operation Only)

At startup with thermostat ON or after the completion of defrosting in heating operation, the AHU fan is controlled to prevent cold air from blasting out and ensure startup capacity.

[Detail of operation]

During hot start, fan on is carried out when Tc is A°C or after B minutes (see “Field Setting”).

Part 6
Control Box EKEQ - CBV3

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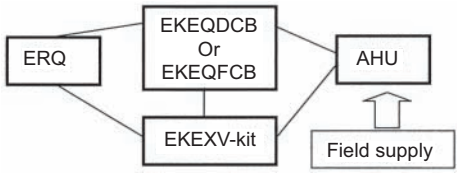
1. Different Systems with their Control Boxes

For steering a field supply AHU by an outdoor inverter heat pump, 2 systems can be used:

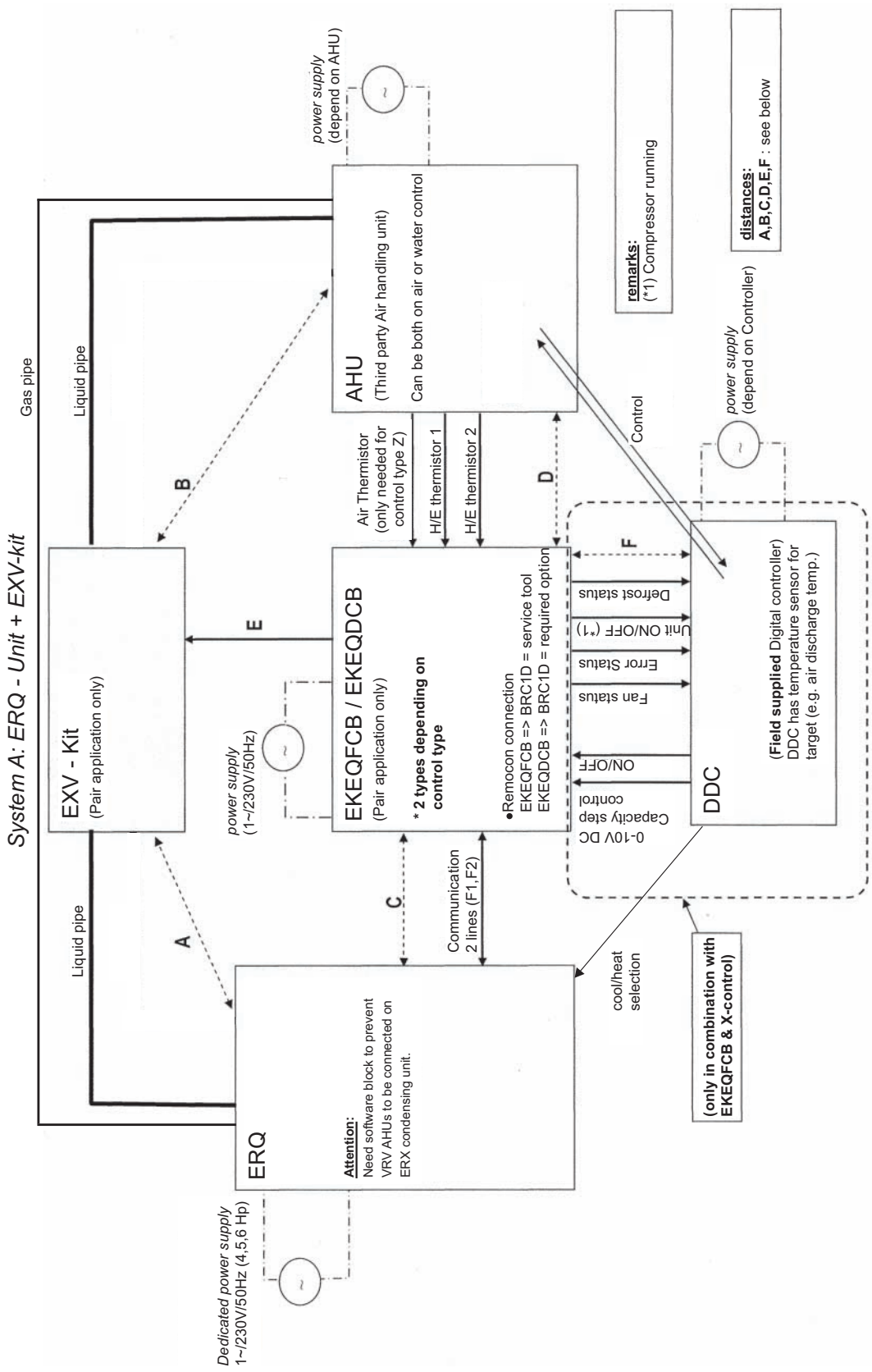
- System A: PAIR application (ERQ-outdoor)
- System B: MULTI application (VRV-outdoor)

1.1 System A: PAIR

System A = PAIR : ERQ + EXV-Kit

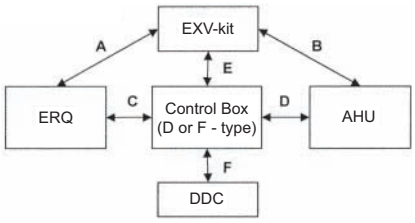


Pair application here means 1 outdoor unit + 1 AHU.
In pair application, there's the choice between 2 control boxes: EKEQD or EKEQF.

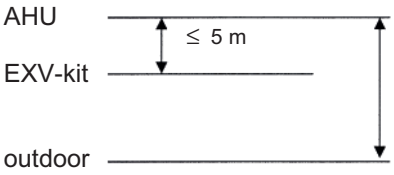

System A: ERQ - Unit + EXV-kit
Gas pipe
Liquid pipe
Liquid pipe
Liquid pipe
power supply
(depend on AHU)
AHU
(Third party Air handling unit)
Can be both on air or water control
remarks:
(*1) Compressor running
distances:
A,B,C,D,E,F : see below
power supply
(depend on Controller)
Control
B
Air Thermistor
(only needed for
control type Z)
H/E thermistor 1
H/E thermistor 2
D
F
EXV - Kit
(Pair application only)
E
EKEQFCB / EKEQDCB
(Pair application only)
* 2 types depending on
control type
•Remocon connection
EKEQFCB => BRC1D = service tool
EKEQDCB => BRC1D = required option
Defrost status
Unit ON/OFF (*1)
Error Status
Fan status
ON/OFF
0-10V DC
Capacity step
control
DDC
(Field supplied Digital controller)
DDC has temperature sensor for
target (e.g. air discharge temp.)
power supply
(1~/230V/50Hz)
A
C
Communication
2 lines (F1,F2)
cool/heat
selection
(only in combination with
EKEQFCB & X-control)
ERQ
Attention:
Need software block to prevent
VRV AHUs to be connected on
ERX condensing unit.
Dedicated power supply
1~/230V/50Hz (4,5,6 Hp)

Allowable lengths and heights

System A:



Allowable height:



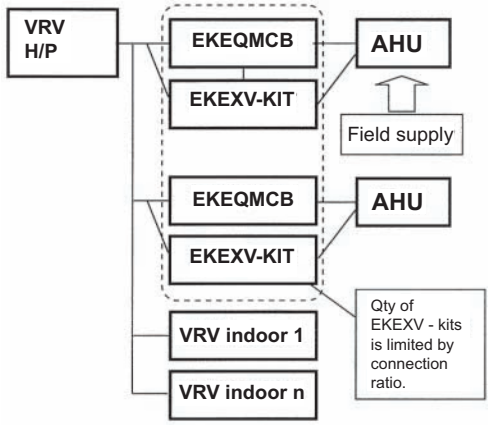
Total system: ≤ 30 m
(outdoor unit can be above
or below the AHU)

		Piping		Communication			
		A	B	C	D	E	F
ERQ 1 phase	100	length: 5 < A ≤ 50 m	length: ≤ 5 m	≤ 100 m	≤ 20 m	≤ 20 m	depend on DDC
	125						
	140						

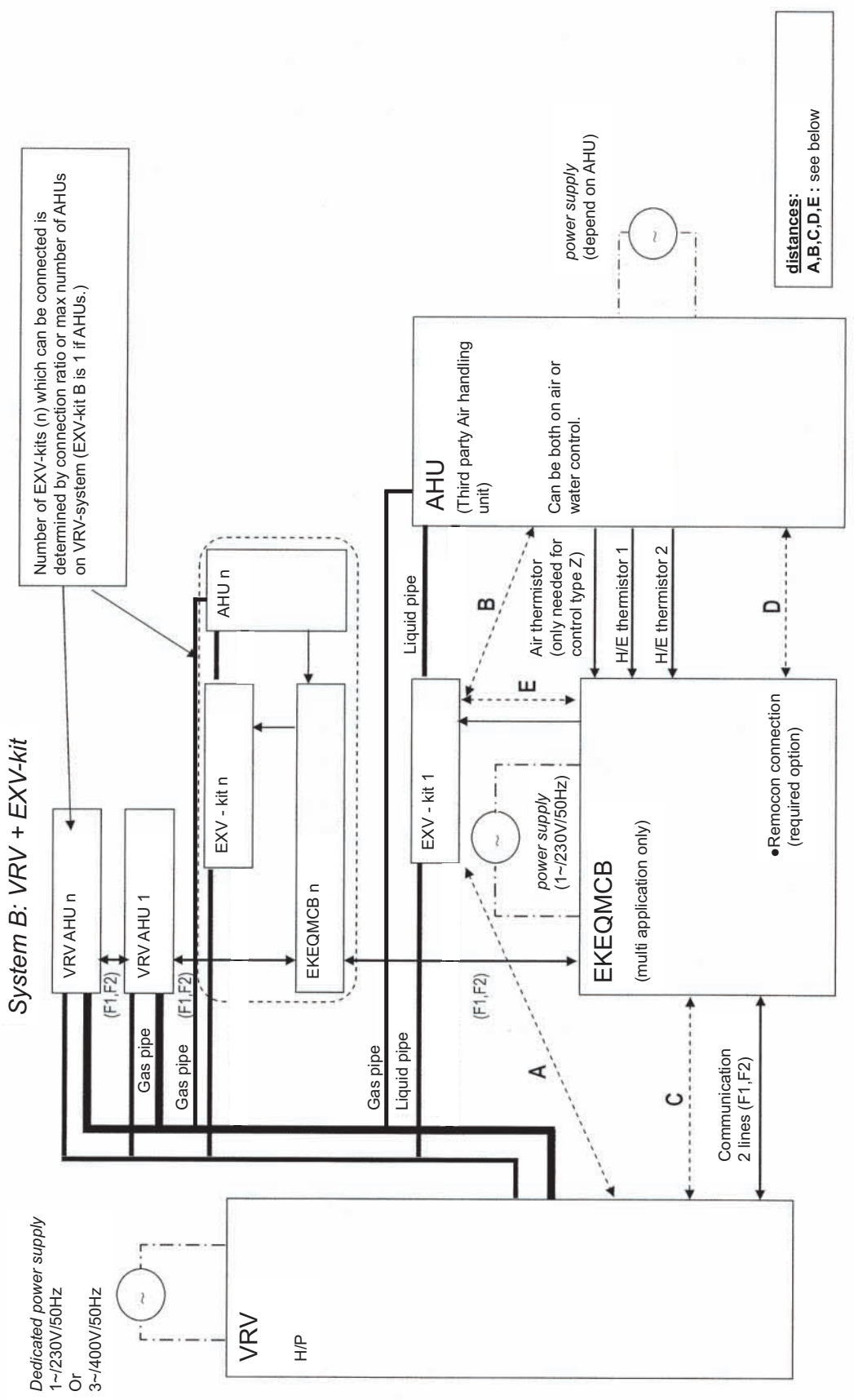
1.2 System B: MULTI

Only for combining VRV + AHU + indoors. No ERQ!

System B = MULTI (suction control) : VRV + EXV-Kit

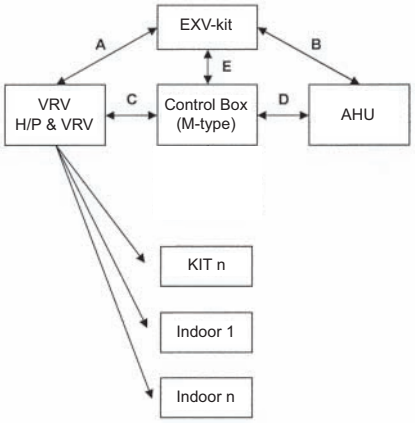


Multi application with VRV means the ability to combine 1 outdoor unit + several AHU, as well as VRV indoors (minimum 1 is required). The required control box for this application is EKEQM.

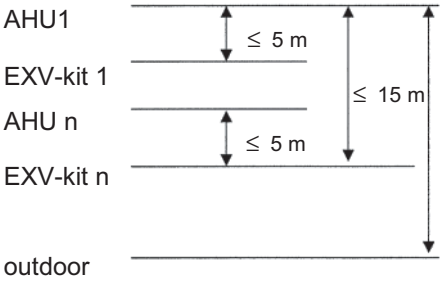

System B: VRV + EXV-kit
Number of EXV-kits (n) which can be connected is determined by connection ratio or max number of AHUs on VRV-system (EXV-kit B is 1 if AHUs.)
VRV AHU n
VRV AHU 1
(F1,F2)
Gas pipe
Gas pipe
(F1,F2)
EXV - kit n
AHU n
EKEQMCB n
Gas pipe
Liquid pipe
EXV - kit 1
Liquid pipe
power supply
(depend on AHU)
AHU
(Third party Air handling unit)
Can be both on air or water control.
distances:
A,B,C,D,E : see below
B
Air thermistor
(only needed for control type Z)
H/E thermistor 1
H/E thermistor 2
D
E
power supply
(1~/230V/50Hz)
EKEQMCB
(multi application only)
•Remocon connection
(required option)
(F1,F2)
A
C
Communication
2 lines (F1,F2)
Dedicated power supply
1~/230V/50Hz
Or
3~/400V/50Hz
VRV
H/P

Allowable lengths and heights

System B:



Allowable height:



Total system: ≤ 40 m
(outdoor unit can be above or below the AHU)

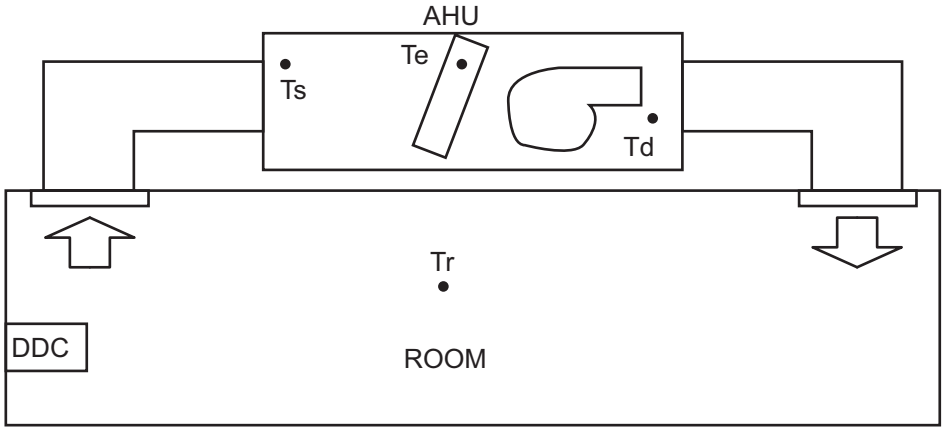
		Piping		Communication		
		A + B	B	C	D	E
VRV	H/P & H/R	consider same as 1 indoor unit	length: ≤ 5 m	follow std. VRV wiring length policy	≤ 50 m	≤ 50 m

Connection ratio: 90-110%

2. X, Y, Z Control

The D, F, M boxes have different types of control, giving the ability to control different temperatures (Td, Ts, Tr, Te or Tc).

Schematic:



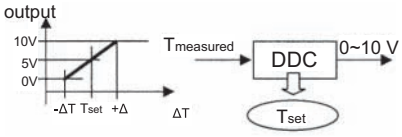
Legend:

T_d	Discharge air control
T_s	Suction air control
T_r	Room air control
T_e	Evaporating temperature control
T_c	Condensing temperature control
AHU	Air handling unit
DDC	Digital controller

EKEQD: Z-control
EKEQF: X, Y-control
EKEQM: Z-control

2.1 X-Control

Control of air temperature (Td, Ts or Tr) by means of an external device (DDC controller, 0-10V control).



$\Delta T = T_{set} - T_{measured}$
$T_{measured} = T_d$, T_s or T_r

Components for control:
- DDC (field supply)
- Air thermistor (field supply)
- BRC1D (only for servicing)

++ Possibility for Td control
Flexibility in applications
-- Higher cost (DDC needed)

In case of X-control, a DDC-controller is needed to operate the unit. This DDC-controller is field supply but in order to connect it to our ERQ-system, it is required that it emits a 0-10 VDC signal towards the control box.

2.1.1 Different levels

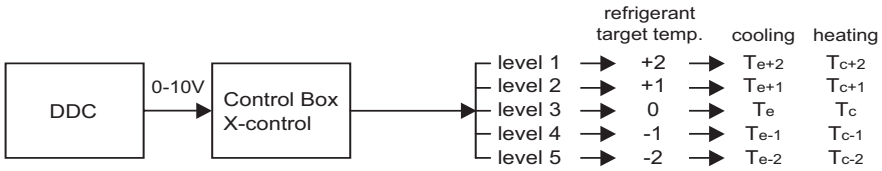
Inside the control box, this 0-10 VDC signal is converted into a voltage level.

The output voltage increase gives the voltage at which the level increases.
The output voltage decrease gives the voltage at which the level decreases.

	Output level	Level 1	Level 2	Level 3	Level 4	Level 5
DDC	Output voltage increasing	1.8 -->	3.8 -->	6.8 -->	8.8 -->	
	Output voltage decreasing	1.2 <--	3.2 <--	6.2 <--	8.2 <--	

Example:
Room temperature = 20°C, set temperature = 25°C. Heating operation: DDC controller, calculates the difference and sends a 3 VDC signal (fictive value) to the control box. This is between 1,8 and 3,8 so in level 2. When the room temperature rises to 23°C, the DDC controller detects a smaller temperature difference and will send out a higher signal, ex. 5 VDC. The output voltage has increased so you have to use the highest line, indicating that you are now in level 3. When the window is opened, the room temperature drops and the difference with the set temperature is higher. The DDC sends a 1 V signal. According to the “output voltage decreasing” line, we are now in level 1.

2.1.2 Refrigerant target temperature



Example, continued:
3 VDC = level 2, thus meaning an increase of the refrigerant target temperature. In heating mode, this means Tc + 1°C. Logically, the room temperature will rise so at the next signal, we are in level 3, where Tc is kept even.

		Cooling	Heating
ΔT < 0	level 1 + level 2	DDC asks less capacity	DDC asks more capacity
ΔT = 0	level 3	no change	no change
ΔT > 0	level 4 + level 5	DDC asks more capacity	DDC asks less capacity

ΔT = room temp. - set temp.

2.2 Y-Control

Control of evaporating and condensing temperature (Te and Tc) by Daikin control (no DDC needed).

Fixed Te or Tc
Te = user setting: -3 ~ 10°C
Tc = user setting: 43 ~ 49°C

Components for control:
- BRC1D (only for servicing)

++ Low cost
No BRC needed
-- No air temperature control

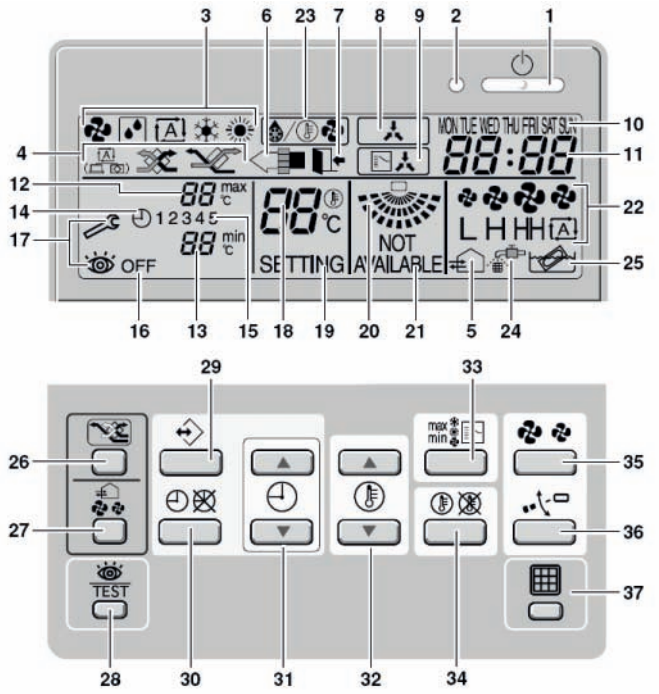
With Y-control, there is no external input to change Te/Tc value. Their values can only be changed by local setup with a Daikin remote control (during installation). We refer to the chapter “Field Setting” for further information.

2.3 Z-Control

Control of air temperature (Ts or Tr) by Daikin control (no DDC needed).

Components for control:
- Air thermistor (Daikin)
- BRC1D (Daikin)
- KRP4A (Daikin option, remote on/off)

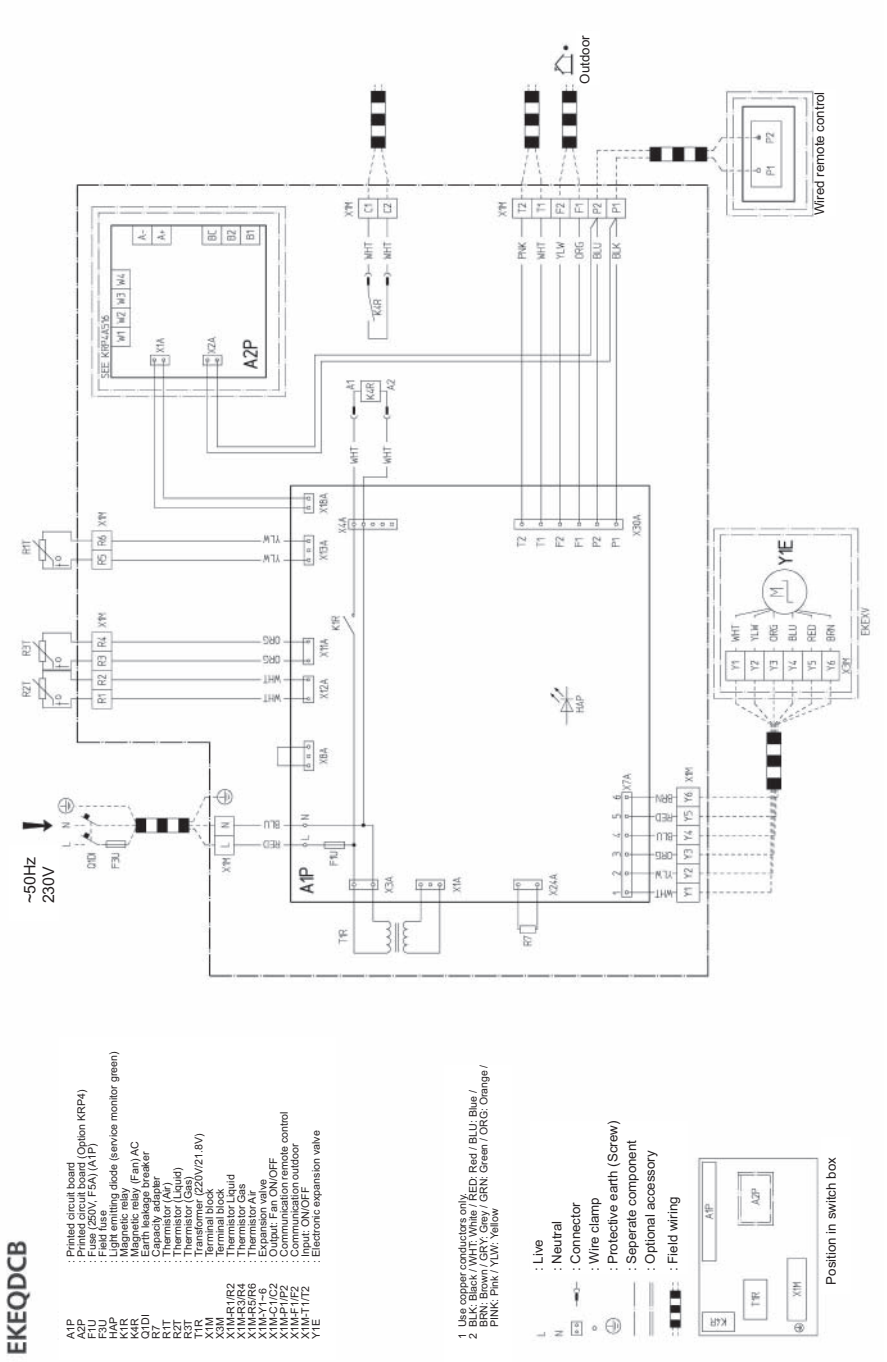
++ Low cost
-- BRC needed
No possibility for Td control



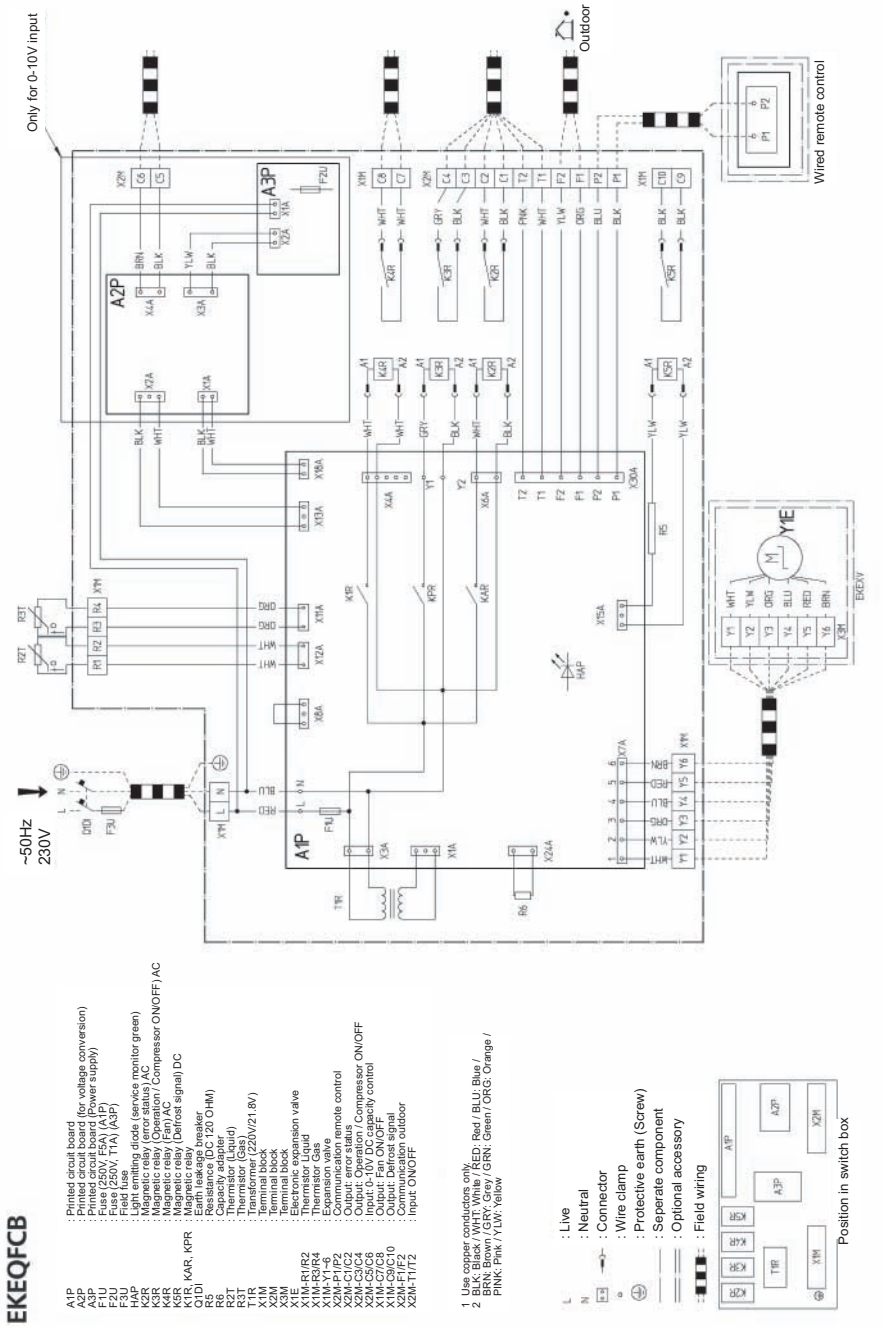
Item	Name	User	Z	BP	M	BM
1	On/off button	Customer	0	0	0	0
28	Inspection/test operation button	Installer	0	0	0	0
29	Programming button	Installer	0	0	0	0
30	Schedule timer button	Customer	0	0	0	0
31	Time adjust buttons	Customer	0	0	0	0
32	Temperature adjust buttons	Customer	0	0	0	0
33	Operation change/min-max button	Customer	0	0	0	0
34	Setpoint/limit button	Customer	0	0	0	0
35	Fan speed button	Customer	x	0	x	x
36	Air flow direction adjust button	Customer	x	x	x	x
37	Air filter cleaning time icon reset button	Customer	x	0	x	x

3. Wiring Diagram of Control Box

3.1 D-box


EKEQDCB
A1P : Printed circuit board
A2P : Printed circuit board (Option KRP4)
F1U : Fuse (250V, F5A) (A1P)
F3U : Field fuse
HAP : Light emitting diode (service monitor green)
K1R : Magnetic relay
K4R : Magnetic relay (Fan) AC
Q1DI : Earth leakage breaker
R7 : Capacity adapter
R1T : Thermistor (Air)
R2T : Thermistor (Liquid)
R3T : Thermistor (Gas)
T1R : Transformer (220V/21.8V)
X1M : Terminal block
X3M : Terminal block
X1M-R1/R2 : Thermistor liquid
X1M-R3/R4 : Thermistor Gas
X1M-R5/R6 : Thermistor Air
X1M-Y1~6 : Expansion valve
X1M-C1/C2 : Outdoor unit ON/OFF
X1M-P1/P2 : Communication remote control
X1M-F1/F2 : Communication outdoor
X1M-T1/T2 : Input: ON/OFF
Y1E : Electronic expansion valve
1 Use copper conductors only.
2 BLK: Black / WHT: White / RED: Red / BLU: Blue /
BRN: Brown / GRY: Grey / GRN: Green / ORG: Orange /
PNK: Pink / YLW: Yellow
L : Live
N : Neutral
: Connector
: Wire clamp
: Protective earth (Screw)
: Seperate component
: Optional accessory
: Field wiring
Position in switch box
~50Hz
230V
A1P
A2P
Outdoor
Wired remote control
YIE
EKEXV

3.2 F-box


EKEQFCB
Only for 0-10V input
~50Hz
230V
Outdoor
Wired remote control
Position in switch box
A1P : Printed circuit board
A2P : Printed circuit board (for voltage conversion)
A3P : Printed circuit board (Power supply)
F1U : Fuse (250V, F5A) (A1P)
F2U : Fuse (250V, T1A) (A3P)
F3U : Field fuse
H1P : Light emitting diode (service monitor green)
K2R : Magnetic relay (Error status) AC
K3R : Magnetic relay (Operation / Compressor ON/OFF) AC
K4R : Magnetic relay (Fan) AC
K5R, K4R, KPR : Magnetic relay (Defrost signal) DC
Q1DI : Earth leakage breaker
R5 : Resistance (DC 120 OHM)
R6 : Capacity adapter
R2T : Thermistor (Liquid)
R3T : Thermistor (Gas)
T1R : Transformer (220V/21.8V)
X1M : Terminal block
X2M : Terminal block
X3M : Terminal block
X1E : Electronic expansion valve
X1M-R1/R2 : Thermistor Liquid
X1M-R3/R4 : Thermistor Gas
X1M-Y1~6 : Expansion valve
X2M-P1/P2 : Communication remote control
X2M-C1/C2 : Output: error status
X2M-C3/C4 : Output: Operation / Compressor ON/OFF
X2M-C5/C6 : Input: 0~10V DC capacity control
X1M-C7/C8 : Output: Fan ON/OFF
X1M-C9/C10 : Output: Defrost signal
X2M-F1/F2 : Communication outdoor
X2M-T1/T2 : Input: ON/OFF
1 Use copper conductors only.
2 BLK: Black / WHT: White / RED: Red / BLU: Blue / BRN: Brown / GRY: Grey / GRN: Green / ORG: Orange / PINK: Pink / YLW: Yellow
L : Live
N : Neutral
: Connector
: Wire clamp
: Protective earth (Screw)
: Seperate component
: Optional accessory
: Field wiring

4. Attention Points

- Do not forget to place the capacity setting adapter. Otherwise, you'll get UA or PJ error. All capacity setting adapters are delivered with the control box.
- Polarity of the C5/C6-contact (F-box, X-control) C5 = "-", C6 = "+"

5. System A: EKEQF & EKEQD-box: Installation and Operation Manual

INSTALLATION AND OPERATION MANUAL

Option kit for combination of Daikin condensing units with field supplied air handling units

Installation and operation manual
Option kit for combination of Daikin condensing units with field supplied air handling units — **English**

Installations- und Bedienungsanleitung
Erweiterungsbausatz für die Verbindung von Daikin-Verflüssigern mit bauseitigen Luftbehandlungsgeräten — **Deutsch**

Manuel d'installation et d'utilisation
Kit d'options pour combinaison de groupes condenseur Daikin et unités de traitement de l'air non fournies — **Français**

Montagehandleiding en gebruiksaanwijzing
Optiekit voor combinatie van condensorunits van Daikin met lokaal geleverde luchtbehandelingsunits — **Nederlands**

Manual de instalación y operación
Kit de opciones para la combinación de unidades de condensación Daikin con unidades de tratamiento de aire suministradas — **Español**

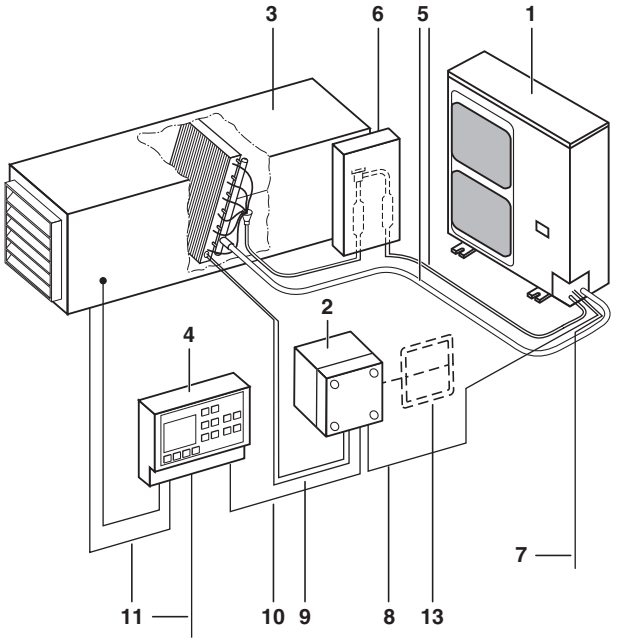
Manuale di installazione e d'uso
Kit opzioni per la combinazione di unità di condensazione Daikin con unità per il trattamento dell'aria non in dotazione — **Italiano**

Manual de instalação e de funcionamento
Kit de opções para combinação de unidades de condensação Daikin com unidades de tratamento de ar existentes no local — **Portugues**

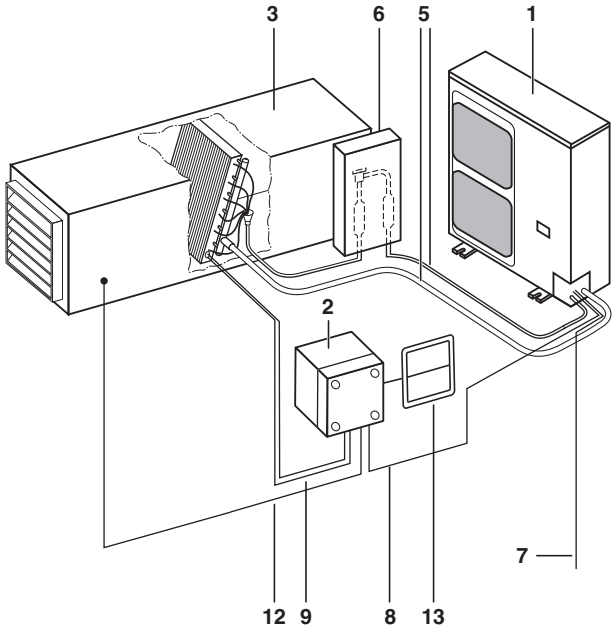
Инструкция по монтажу и эксплуатации
Комплект дополнительного оборудования для подключения конденсаторных агрегатов Daikin к приобретаемым на внутреннем рынке — **русский**

Instrukcja montażu i instrukcja obsługi
Zestaw opcji dla agregatów skraplających Daikin w konfiguracji z centralami klimatyzacyjnymi dostarczanymi osobno — **polski**

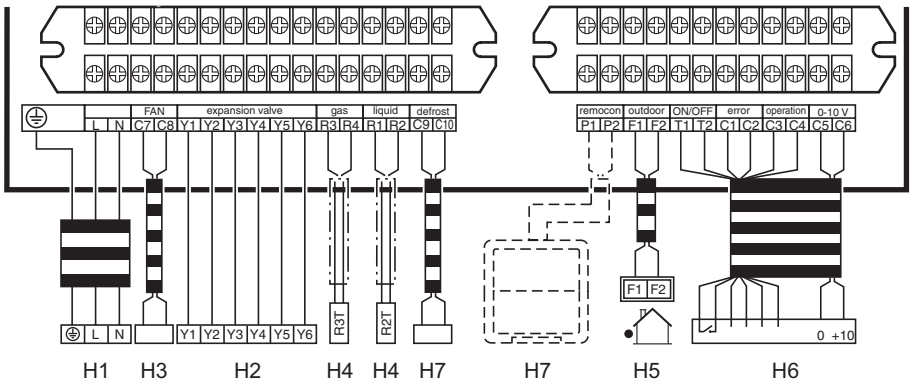
EKEQFCBV3
EKEQDCBV3



1 EKEQFCBV3



2 EKEQDCBV3



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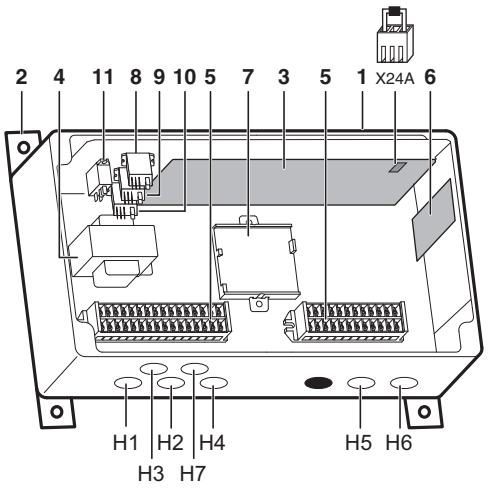

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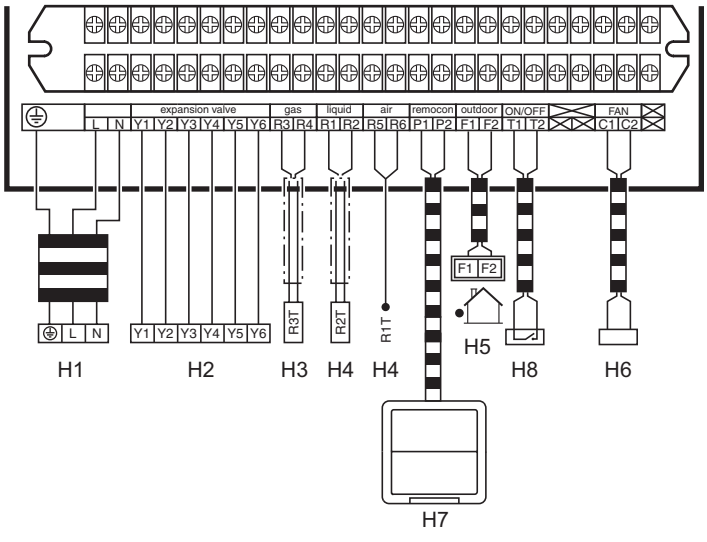

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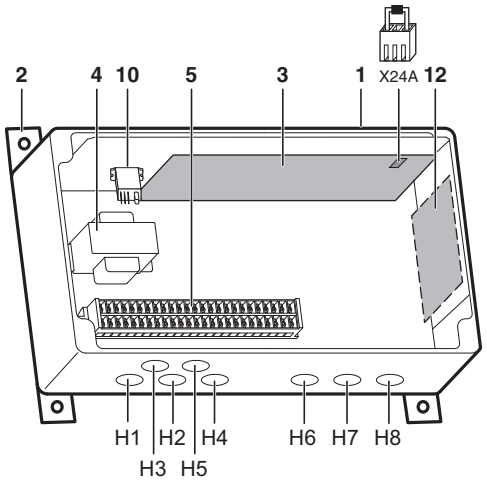

6 EKEQDCBV3

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READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLATION AND OPERATION.

IMPROPER INSTALLATION OR ATTACHMENT OF EQUIPMENT OR ACCESSORIES COULD RESULT IN ELECTRIC SHOCK, SHORT-CIRCUIT, LEAKS, FIRE OR OTHER DAMAGE TO THE EQUIPMENT. BE SURE ONLY TO USE ACCESSORIES MADE BY DAIKIN WHICH ARE SPECIFICALLY DESIGNED FOR USE WITH THE EQUIPMENT AND HAVE THEM INSTALLED BY A PROFESSIONAL.

IF UNSURE OF INSTALLATION PROCEDURES OR USE, ALWAYS CONTACT YOUR DAIKIN DEALER FOR ADVICE AND INFORMATION.

The English text is the original instruction. Other languages are translations of the original instructions.

INTRODUCTION

- Do only use this system in combination with a field supplied air handling unit. Do not connect this system to other indoor units.
- Only optional controls as listed in the optional accessories list can be used.

We distinguish 2 different control boxes, each with its own application and installation requirements.

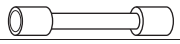
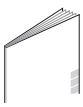
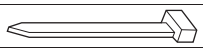
- EKEQFCB control box (2 possible operation modes)
  - Operation with 0–10 V input to control the capacity
    An external controller is needed to control the capacity. For details of the necessary functions of the external controller refer to paragraph "Operation with 0–10 V capacity control". It can be used to control the room temperature or air discharge temperature.
  - Operation with fixed T_e/T_c temperature control
    This system operates on a fixed evaporating temperature.
- EKEQDCB control box
  The system will operate as a standard indoor unit to control the room temperature. This system does not require a specific external controller.
- Do NOT connect the system to DIII-net devices:
  - intelligent touch Controller
  - intelligent Manager
  - DMS-IF
  - BACnet Gateway
  - ...

  This could result in malfunction or breakdown of the total system.
- This equipment is not designed for year-round cooling applications with low indoor humidity conditions, such as Electronic Data Processing rooms.
- This appliance is not intended for use by persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
  Children should be supervised to ensure that they do not play with the appliance.

INSTALLATION

- For installation of the air handling unit, refer to the air handling unit installation manual.
- Never operate the air conditioner with the discharge pipe thermistor (R3T), suction pipe thermistor (R2T) and pressure sensors (S1NPH, S1NPL) removed. Such operation may burn out the compressor.
- The equipment is not intended for use in a potentially explosive atmosphere.

ACCESSORIES

		EKEQFCB	EKEQDCB
Thermistor (R1T)		—	1
Thermistor (R3T/R2T) (2.5 m cable)		2	
Insulation sheet		2	
Rubber sheet		2	
Wire to wire splice		4	6
Installation and operation manual		1	
Screw nut		7	8
Tie wrap		6	
Capacity setting adapter		7	
Stopper (closing cup)		2	—

Obligatory accessory

	EKEQFCB	EKEQDCB
Expansion valve kit	EKEXV	

Refer to chapter "Valve kit installation" on page 61 for installation instructions.

Optional accessories

		EKEQFCB	EKEQDCB
remote control		1(*)	1

(*) Not required for operation, only useful accessory tool for service and installation.

NAME AND FUNCTION OF PARTS

(See figure 1 and figure 2)

Parts and components

1 Outdoor unit

2 Control box (EKEQFCB / EKEQDCB)

3 Air handling unit (field supply)

4 Controller (field supply)

5 Field piping (field supply)

6 Expansion valve kit

Wiring connections

7 Outdoor unit power supply

8 Control box wiring
(Power supply and communication between control box and outdoor unit)

9 Air handling unit thermistors

10 Communication between controller and control box

11 Power supply and control wiring for air handling unit and controller (power supply is separate from the outdoor unit)

12 Air thermistor control for air handling unit

13 remote control (--------- = for service only)

BEFORE INSTALLATION

Cautions for selection of the air handling unit

See table below for applicable units.

Select the air handling unit (field supply) according to the technical data and limitations mentioned below.

The design pressure of the air handling unit is at least 40 bar.

Lifetime of the outdoor unit, operation range or operation reliability may be influenced if you neglect these limitations.

Limits for outdoor unit (expansion valve kit)

Outdoor unit (class)	EKEXV kit
100	EKEXV63~125
125	EKEXV63~140
140	EKEXV80~140

Outdoor unit (class)	EKEXV kit
200	EKEXV100~250
250	EKEXV125~250

Depending on the heat exchanger, a connectable EKEXV (expansion valve kit) must be selected to these limitations.

EKEXV class	Allowed heat exchanger volume (dm^3)		Allowed heat exchanger capacity (kW)	
	Minimum	Maximum	Minimum	Maximum
63	1.66	2.08	6.3	7.8
80	2.09	2.64	7.9	9.9
100	2.65	3.30	10.0	12.3
125	3.31	4.12	12.4	15.4
140	4.13	4.62	15.5	17.6
200	4.63	6.60	17.7	24.6
250	6.61	8.25	24.7	30.8

Saturated suction temperature (SST) = 6°C, SH (superheat) = 5 K, air temperature = 27°C DB / 19°C WB.

1 Selecting the condensing unit

Depending on necessary capacity of the combination an outdoor unit needs to be selected (see "Engineering databook" for capacity).

- Each outdoor unit can be connected to a range of air handling units.
- The range is determined by the allowed expansion valve kits.

2 Selecting the expansion valve

The corresponding expansion valve needs to be selected for your air handling unit. Select the expansion valve according to the above limitations.

NOTE

- If conflicting result, capacity selection has priority over volume.
- The expansion valve is an electronic type, it is controlled by the thermistors that are added in the circuit. Each expansion valve can control a range of air handling units sizes.
- The selected air handling unit must be designed for R410A.
- Extraneous substances (including mineral oils or moisture) must be prevented from getting mixed into the system.
- SST: saturated suction temperature at exit of air handling unit.

3 Selecting the capacity setting adapter (see accessories)

- The corresponding capacity setting adapter needs to be selected depending on the expansion valve.
- Connect the correct selected capacity setting adapter to X24A (A1P). (See figure 4 and figure 6)

EKEXV kit	Capacity setting adapter label (indication)
63	J71
80	J90
100	J112
125	J140

EKEXV kit	Capacity setting adapter label (indication)
140	J160
200	J224
250	J280

For the following items, take special care during construction and check after installation is finished

Tick ✓ when checked	
☐	Are the thermistors fixed firmly? Thermistor may come loose.
☐	Is the freeze-up setting done correctly? The air handling unit may freeze up.
☐	Is the control box fixed firmly? The unit may drop, vibrate or make noise.
☐	Do electrical connections comply with specifications? The unit may malfunction or components may burn out.
☐	Are wiring and piping correct? The unit may malfunction or components may burn out.
☐	Is the unit safely grounded? Dangerous at electric leakage.

SELECTING THE INSTALLATION SITE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Select an installation site where the following conditions are fulfilled and that meets your customer's approval.

- The option boxes (expansion valve and electrical control box) can be installed inside and outside).
- Do not install the option boxes in or on the outdoor unit.
- Do not put the option boxes in direct sunlight. Direct sunlight will increase the temperature inside the option boxes and may reduce its lifetime and influence its operation.
- Choose a flat and strong mounting surface.
- Operating temperature of the control box is between –10°C and 40°C.
- Keep the space in front of the boxes free for future maintenance.
- Keep air handling unit, power supply wiring and transmission wiring at least 1 m away from televisions and radios. This is to prevent image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if 1 m is kept.)
- Make sure the control box is installed horizontally. Screw nuts position must be downwards.

Precautions

Do not install or operate the unit in rooms mentioned below.

- Where mineral oil, like cutting oil is present.
- Where the air contains high levels of salt such as air near the ocean.
- Where sulphurous gas is present such as that in areas of hot spring.
- In vehicles or vessels.
- Where voltage fluctuates a lot such as that in factories.
- Where high concentration of vapor or spray are present.
- Where machines generating electromagnetic waves are present.
- Where acidic or alkaline vapor is present.
- The option boxes must be installed with entrances downward.

VALVE KIT INSTALLATION

Mechanical installation

1 Remove the valve kit box cover by unscrewing 4x M5.

2 Drill 4 holes on correct position (measurements as indicated in figure below) and fix the valve kit box securely with 4 screws through the provided holes Ø9 mm.

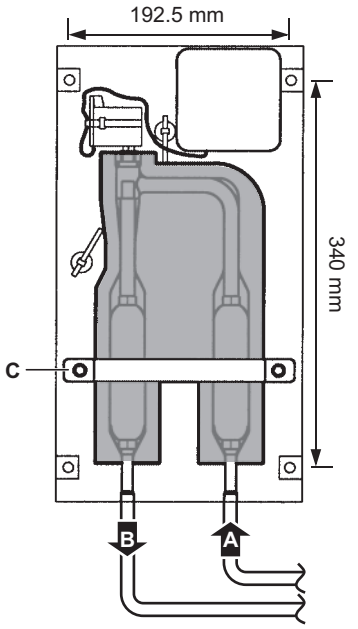
NOTE

- Make sure that the expansion valve is installed vertically.
- Make sure there is enough free space for future maintenance.

Brazing work

For details, see manual of the outdoor unit.

3 Prepare the inlet/outlet field piping just in front of the connection (do **not** braze yet).



A Inlet coming from the outdoor unit
B Outlet to air handling unit
C Pipe fixing clamp

4 Remove the pipe fixing clamp (C) by unscrewing 2x M5.

5 Remove the upper and lower pipe insulations.

6 Braze the field piping.

- Make sure to cool the filters and valve body with a wet cloth and make sure the body temperature does not exceed 120°C during brazing.
- Make sure that the other parts such as electrical box, tie wraps and wires are protected from direct brazing flames during brazing.

7 After brazing, put the lower pipe insulation back in place and close it with the upper insulation cover (after pealing off the liner).

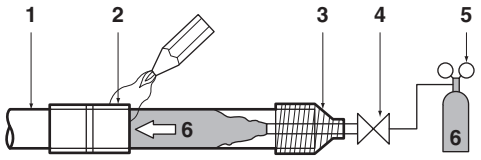
8 Secure the pipe fixing clamp (C) in place again (2x M5).

9 Make sure that field pipes are fully insulated.

Field pipe insulation must reach up to the insulation you have put back in place as per procedure step 7. Make sure that there is no gap between both ends in order to avoid condensation dripping (finish the connection with tape eventually).

Cautions for brazing

- Be sure to carry out a nitrogen blow when brazing.
  Brazing without carrying out nitrogen replacement or releasing nitrogen into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.
- When brazing while inserting nitrogen into the piping, nitrogen must be set to 0.02 MPa with a pressure-reducing valve (=just enough so that it can be felt on the skin).



1 Refrigerant piping
2 Part to be brazed
3 Taping
4 Hands valve
5 Pressure-reducing valve
6 Nitrogen

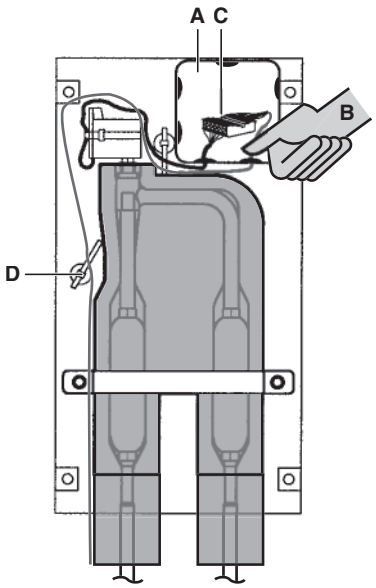
- For details, see manual of the outdoor unit.

Electrical work

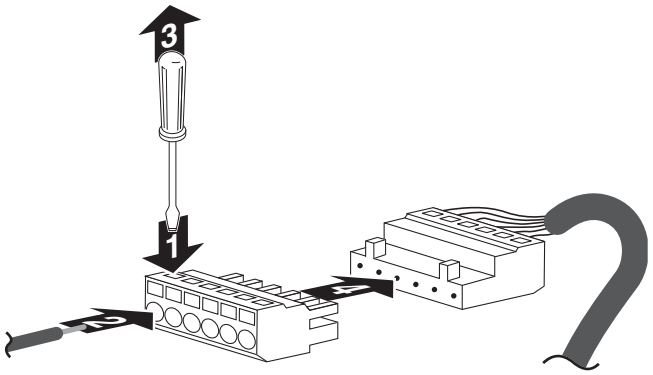
1 Open the electrical box cover (A).

2 Push out **ONLY** the second lower wire intake hole (B) from inside to outside. Do not damage the membrane.

3 Pass valve cable (with wires Y1 ... Y6) from the control box through that membrane wire intake hole and connect the cable wires into the terminal connector (C) following instructions as described in step 4. Route the cable out of the valve kit box according to figure below and fix with the tie wrap (D). See "Electric wiring work" on page 62 for more details.



4 Use a small screwdriver and follow indicated instructions for connecting cable wires into the terminal connector according to the wiring diagram.



5 Make sure that field wiring and insulation is not squeezed when closing the valve kit box cover.

6 Close the valve kit box cover (4x M5).

INSTALLATION OF THE ELECTRICAL CONTROL BOX (See figure 4 and figure 6)

1 Control box
2 Hanger brackets
3 Main PCB
4 Transformer
5 Terminal
6 PCB (for voltage conversion)
7 PCB (power supply)
8 Magnetic relay (operation / compressor ON/OFF)
9 Magnetic relay (error status)
10 Magnetic relay (fan)
11 Magnetic relay (defrost)
12 Optional PCB (KRP4)

Mechanical installation

1 Fix the control box with its hanger brackets to the mounting surface.
Use 4 screws (for holes of Ø6 mm).

2 Open the lid of the control box.

3 For electrical wiring: refer to paragraph "Electric wiring work" on page 62.

4 Install the screw nuts.

5 Close the unnecessary openings with stoppers (closing cups).

6 Close the lid securely after installation to ensure that the control box is watertight.

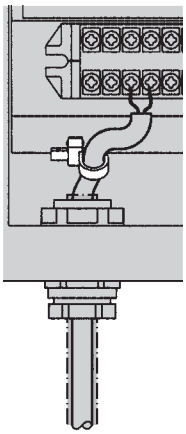
ELECTRIC WIRING WORK

- All field supplied parts and materials and electric works must be conform to local codes.
- Use copper wire only.
- All wiring must be performed by an authorized electrician.
- A main switch or other means for disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with relevant local and national legislation.
- Refer to the installation manual attached to the outdoor unit for the size of power supply electric wire connected to the outdoor unit, the capacity of the circuit breaker and switch, wiring and wiring instructions.
- Attach the earth leakage circuit breaker and fuse to the power supply line.

Connection of the wires inside the control box

1 For connection to outdoor unit and to controller (field supply):
Pull the wires inside through the screw nut and close the nut firmly in order to ensure a good pull relieve and water protection.

2 The cables require an additional pull-relief. Strap the cable with the installed tie wrap.



Precautions

- Thermistor cable and remote control wire should be located at least 50 mm away from power supply wires and from wires to the controller. Not following this guideline may result in malfunction due to electrical noise.
- Use only specified wires, and tightly connect wires to the terminals. Keep wiring in neat order so that it does not obstruct other equipment. Incomplete connections could result in overheating, and in worse case electric shock or fire.

Connecting the wiring: EKEQFCBV3

- Connect the wires to the terminal board according to the wiring diagram in figure 3. See figure 4 for wiring intake in the control box. The wiring intake hole indication H1 refers to the H1 cable of the corresponding wiring diagram.
- Connect cables according to specifications of the next table.

> Take special precaution for connection to the controller (field supply). Do not miswire the output signals nor the input signal (ON/OFF). This mistake could damage the entire system.

Table connection and application

	Description	Connect to	Type of cable	Cross section (mm^2)(*)	Maximum length (m)	Specifications
L, N, earth	Power supply	Power supply	H05VV-F3G2.5	2.5	—	Power supply 230 V 1~ 50 Hz
Y1~Y6	Expansion valve connection	Expansion valve kit	LIYCY3 x 2 x 0.75	0.75	20	Digital output 12 V DC
R1,R2	Thermistor R2T (liquid pipe)	—	H05VV-F2 x 0.75		Standard 2.5 Maximum 20	Analog input 16 V DC
R3,R4	Thermistor R3T (gas pipe)					
P1,P2	remote control (optional)				100	Communication line 16 V DC
F1,F2	Communication to outdoor unit	Outdoor unit				
T1,T2	ON/OFF	Controller field supply	LIYCY4 x 2 x 0.75		(†)	Digital input 16 V DC
C1,C2	Error signal					Digital output: voltage free. Maximum 230 V, maximum 0,5 A
C3,C4	Operation signal(‡)					
C5,C6	Capacity step(#)					Analog input: 0–10 V
C7,C8	Fan signal	Air handling unit fan field supply	H05VV-F3G2.5	2.5	—	Digital output: voltage free. Maximum 230 V, maximum 2 A
C9,C10	Defrost signal	Controller field supply	LIYCY4 x 2 x 0.75	0.75	(†)	Digital output: voltage free. Maximum 230 V, maximum 0,5 A

(*) Recommended size (all wiring must comply with local codes).
(†) The maximum length depends on the external device that is connected (controller/relay,....)
(‡) Operation signal: indicates compressor operation.
(#) Only necessary for capacity controlled system.

Wiring diagram

A1P.....Printed circuit board
A2P.....Printed circuit board (for voltage conversion)
A3P.....Printed circuit board (power supply)
F1U.....Fuse (250 V, F5A)(A1P)
F2U.....Fuse (250 V, T1A)(A3P)
F3U.....Field fuse
HAP .....Light emitting diode (service monitor-green)
K2R.....Magnetic relay (error status)
K3R.....Magnetic relay (operation / compressor ON/OFF)
K4R.....Magnetic relay (fan)
K5R.....Magnetic relay (defrost signal)
K1R,KAR,KPR....Magnetic relay
Q1DI .....Earth leakage breaker
R2T.....Thermistor (liquid)
R3T.....Thermistor (gas)
R5.....Resistance (120 Ω)
R6.....Capacity adapter
T1R.....Transformer (220 V/21.8 V)
X1M,X2M,X3M ...Terminal block
Y1E.....Electronic expansion valve
X1M-C7/C8.....Output: fan ON/OFF
X1M-C9/C10.....Output: defrost signal
X1M-R1/R2.....Thermistor liquid
X1M-R3/R4.....Thermistor gas
X1M-Y1~6 .....Expansion valve
X2M-C1/C2.....Output: error status
X2M-C3/C4 ..... Output: operation / compressor ON/OFF
X2M-C5/C6..... Input: 0-10 V DC capacity control
X2M-F1/F2..... Communication outdoor unit
X2M-P1/P2 ..... Communication remote control
X2M-T1/T2..... Input: ON/OFF
..... Field wiring
L..... Live
N..... Neutral
, ... Connector
..... Wire clamp
..... Protective earth (screw)
..... Separate component
..... Optional accessory
BLK..... Black
BLU..... Blue
BRN ..... Brown
GRN..... Green
GRY..... Gray
ORG ..... Orange
PNK ..... Pink
RED ..... Red
WHT ..... White
YLW ..... Yellow

Connecting the wiring: EKEQDCBV3

- Connect the wires to the terminal board according to the wiring diagram in figure 5. See figure 6 for wiring intake in the control box. The wiring intake hole indication H1 refers to the H1 cable of the corresponding wiring diagram.
- Connect cables according to specifications of the next table.

Table connection and application

	Description	Connect to	Type of cable	Cross section (mm^2)(*)	Maximum length (m)	Specifications
L, N, earth	Power supply	Power supply	H05VV-F3G2.5	2.5	—	Power supply 230 V 1~ 50 Hz
Y1~Y6	Expansion valve connection	Expansion valve kit	LIYCY3 x 2 x 0.75	0.75	20	Digital output 12 V DC
R1,R2	Thermistor R2T (liquid pipe)	—	H05VV-F2 x 0.75		Standard: 2.5 Max.: 20	Analog input 16 V DC
R3,R4	Thermistor R3T (gas pipe)					
R5,R6	Thermistor R1T (air)					
P1,P2	remote control				100	Communication line 16 V DC
F1,F2	Communication to outdoor unit	Outdoor unit				
T1,T2	ON/OFF	Controller field supply			—	Digital input 16 V DC
—	Capacity step		LIYCY4 x 2 x 0.75	Optional connection: when the function of the switch box needs to be extended: see KRP4A51 for details of settings and instructions.		
—	Error signal					
—	Operation signal					
C1,C2	Fan signal	Air handling unit fan field supply	H05VV-F3G2.5	2.5	—	Digital output: voltage free. Maximum 230 V, maximum 2 A

(*) Recommended size (all wiring must comply with local codes).

Wiring diagram

A1P ..... Printed circuit board
A2P ..... Printed circuit board (option KRP4)
F1U ..... Fuse (250 V, F5A)(A1P)
F3U ..... Field fuse
HAP ..... Light emitting diode (service monitor-green)
K1R ..... Magnetic relay
K4R ..... Magnetic relay (fan)
Q1DI ..... Earth leakage breaker
R1T ..... Thermistor (air)
R2T ..... Thermistor (liquid)
R3T ..... Thermistor (gas)
R7 ..... Capacity adapter
T1R ..... Transformer (220 V/21.8 V)
X1M,X3M ..... Terminal block
Y1E ..... Electronic expansion valve
X1M-C1/C2 ..... Output: fan ON/OFF
X1M-F1/F2 ..... Communication outdoor unit
X1M-P1/P2 ..... Communication remote control
X1M-R1/R2 ..... Thermistor liquid
X1M-R3/R4 ..... Thermistor gas
X1M-R5/R6 ..... Thermistor air
X1M-T1/T2 ..... Input: ON/OFF
X1M-Y1~6 ..... Expansion valve

..... Field wiring
L ..... Live
N ..... Neutral
, ... Connector
..... Wire clamp
..... Protective earth (screw)
..... Separate component
..... Optional accessory
BLK ..... Black
BLU ..... Blue
BRN ..... Brown
GRN ..... Green
GRY ..... Gray
ORG ..... Orange
PNK ..... Pink
RED ..... Red
WHT ..... White
YLW ..... Yellow

INSTALLATION OF THERMISTORS

Refrigerant thermistors

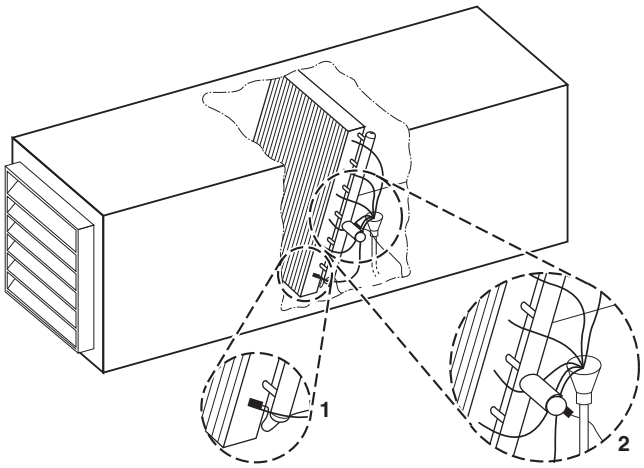
Location of the thermistor

A correct installation of the thermistors is required to ensure a good operation:

1. Liquid (R2T)
   Install the thermistor behind the distributor on the coldest pass of the heat exchanger (contact your heat exchanger dealer).
2. Gas (R3T)
   Install the thermistor at the outlet of the heat exchanger as close as possible to the heat exchanger.

Evaluation must be done to check if the air handling unit is protected against freeze-up.

Execute test operation and check for freeze-up.



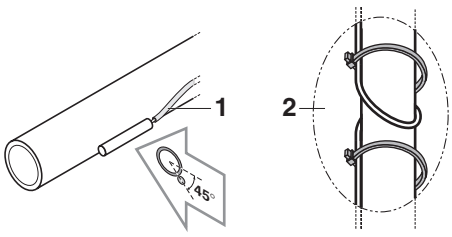
1 Liquid R2T

2 Gas R3T

Installation of the thermistor cable

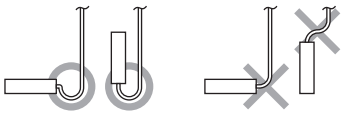
1 Put the thermistor cable in a separate protective tube.

2 Always add a pull-relief to the thermistor cable to avoid strain on the thermistor cable and loosening of the thermistor. Strain on the thermistor cable or loosening of the thermistor may result in bad contact and incorrect temperature measurement.

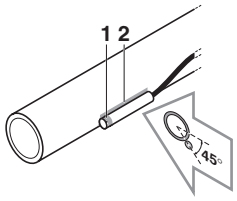


Fixation of the thermistor

- Put the thermistor wire slightly down to avoid water accumulation on top of the thermistor.



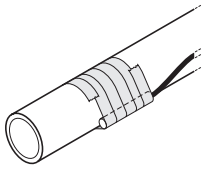
- Make good contact between thermistor and air handling unit. Put the top of the thermistors on the air handling unit, this is the most sensitive point of the thermistor.



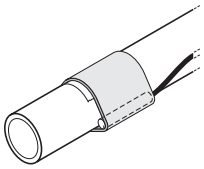
1 Most sensitive point of the thermistor

2 Maximize the contact

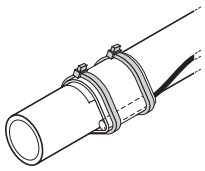
1 Fix the thermistor with insulating aluminum tape (field supply) in order to ensure a good heat transference.



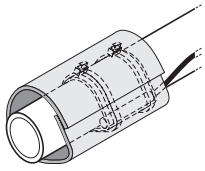
2 Put the supplied piece of rubber around the thermistor (R2T/R3T) in order to avoid loosening of the thermistor after some years.



3 Fasten the thermistor with 2 tie wraps.



4 Insulate the thermistor with the supplied insulation sheet.



Air thermistor (only for EKEQDCB)

The air thermistor (R1T) can be installed either in the room that needs temperature control or in the suction area of the air handling unit.

NOTE For room temperature control the delivered thermistor (R1T) can be replaced by an optional remote sensor kit KRCS01-1(A) (to be ordered separately).

Installation of longer thermistor cable (R1T/R2T/R3T)

The thermistor is supplied with a standard cable of 2.5 m. This cable can be made longer to up to 20 m.

Install the longer thermistor cable with the delivered wire to wire splices

1 Cut the wire or bundle the remainder of the thermistor cable.
Keep at least 1 m of the original thermistor cable.
Do not bundle the cable inside the control box.

2 Strip the wire ±7 mm at both ends and insert these ends into the wire to wire splice.

3 Pinch the splice with the correct crimp tool (pliers).

4 After connection, heat up the shrink-insulation of the wire to wire splice with a shrink-heater to make a water tight connection.

5 Wrap electrical insulation tape around the connection.

6 Put a pull-relief in front of and behind the connection.

- The connection must be made on an accessible location.
- To make the connection waterproof, the connection can also be made in a switch box or connector box.
- The thermistor cable should be located at least 50 mm away from power supply wire. Not following this guideline may result in malfunction due to electrical noise.

REFRIGERANT PIPING WORK

All field piping must be provided by a licensed refrigeration technician and must comply with the relevant local and national codes.

- For refrigerant piping of outdoor unit, refer to the installation manual supplied with the outdoor unit.
- Follow the outdoor unit specifications for additional charging, piping diameter and installation.
- The maximum allowed piping length depends on the connected outdoor model.

TEST OPERATION

Before executing "test operation" as well as before operating the unit, you must check the following:

- Refer to the section of "For the following items, take special care during construction and check after installation is finished" on page 60.
- After finishing the construction of refrigerant piping, drain piping and electric wiring, conduct test operation accordingly to protect the unit.
- Open the gas side stop valve.
- Open the liquid side stop valve.

Executing the test operation

1 Close the contact T1/T2 (ON/OFF).

2 Confirm function of the unit according to the manual and check if the air handling unit has collected ice (freeze-up).
If the unit collects ice: see "Troubleshooting" on page 68.

3 Confirm that the fan of the air handling unit is ON.

- In case of poor distribution in the air handling unit, 1 or more passes of the air handling unit may freeze-up (collect ice) → put the thermistor (R2T) on this position.
- Depending on operation conditions (e.g.: outdoor ambient temperature) it is possible that the settings must be changed after commissioning.

OPERATION AND MAINTENANCE

If T1/T2 is applicable:

- Closing the T1/T2 signal starts operation of the air handling unit.
- Opening the T1/T2 signal stops operation of the air handling unit.

WHAT TO DO BEFORE OPERATION

- Before initiating operation, contact your dealer to get the operation manual that corresponds to your system.
- Refer to the dedicated manual of the controller (field supply) and air handling unit (field supply).
- Make sure that the air handling unit fan is ON when the outdoor unit is in normal operation.

Field settings for EKEQDCB

Refer to the installation manuals of both the outdoor unit and the remote control.

Field settings for EKEQFCB

When changing the settings:

1 Make the required settings.

2 Turn power OFF.

3 Remove the remote control after servicing and checking the system in cooling mode. Operating the remote control may disturb the normal operation of the system.

4 Do not change T1/T2 during power failure.

5 Put power of indoor and outdoor unit ON.

Setting the temperature control system

Mode No.	Code No.	Description of setting
13(23)–0	01	Operation with 0–10 V capacity control (= factory setting)
	02	Operation with fixed T_e/T_c temperature control

T_e or SST = evaporating temperature or saturated suction temperature. T_c = condensing temperature.

Operation with 0–10 V capacity control

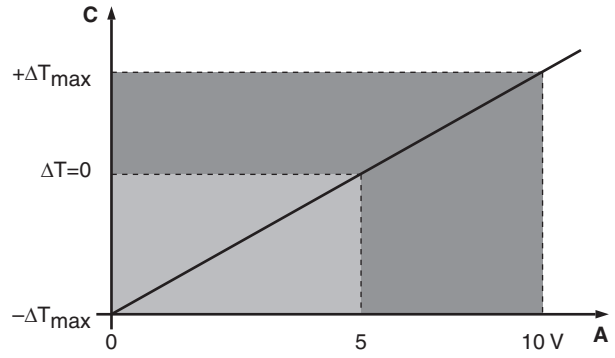
The 0–10 V input is only used for this system of operation and is the base of the capacity control.

This system needs a field supplied controller with a temperature sensor. The temperature sensor can be used to control any temperature:

- Suction air of the air handling unit
- Room air
- Discharge air of the air handling unit

Program the field supplied controller to generate a 0–10 V signal within conditions as listed. Also refer to the graphic and further data in this paragraph for more details.

- When target temperature is reached: 5 V
- When lower refrigerant temperature is needed: 5–10 V
- When higher refrigerant temperature is needed: 0–5 V



A	Controller voltage output to EKEQFCB
	Capacity increase area
	Capacity decrease area
Voltage output	= linear function with ΔT
ΔT	= [actual measured temperature] – [target temperature] When ΔT=0, the target temperature is reached.
ΔT_{max}	= maximum temperature variation as defined by installation Recommended value for ΔT_{max}=[1°C~5°C].

ΔT (°C)	$-\Delta T_{max}$	0	$+\Delta T_{max}$
Voltage output from controller (field supply)	0 V	5 V	10 V

Operation with fixed T_e/T_c temperature control

The evaporating temperature (T_e)/condensing temperature (T_c) at which the application has to operate can be set by code numbers as listed below.

Mode No.	Code No.	Description of setting(*)
13(23)–1	01	T_e = 3°C
	02	T_e = 4°C
	03	T_e = 5°C
	04	T_e = 6°C (factory setting)
	05	T_e = 7°C
	06	T_e = 8°C
	07	T_e = 9°C
	08	T_e = 10°C
13(23)–2	01	T_c = 43°C
	02	T_c = 44°C
	03	T_c = 45°C
	04	T_c = 46°C (factory setting)
	05	T_c = 47°C
	06	T_c = 48°C
	07	T_c = 49°C

(*) Depending on the operating temperature condition or on selection of the air handling unit, operation or safety activation of the outdoor unit may take priority and actual T_e/T_c will be different from the set T_e/T_c .

Operation setting in case of power failure

Measures must be taken to ensure that after power failure, T1/T2 is according to the setting of your preference. Neglecting this caution will result in improper operation.

Mode No.	Code No.	Description of setting
12(22)–5	01	T1/T2 must be open at power restore.(*)
	02	After power failure, the status of T1/T2 must remain identical to the initial T1/T2 status prior to the power failure.

(*) After power failure, T1/T2 must be changed to open (no cooling/heating requested).

OPERATION AND DISPLAY SIGNALS

For EKEQF only			
Output	C1/C2 error signal	Error: open	Abnormal operation on condenser or control system
			Power failure
		No error: closed (relay activated)	Normal operation
			T1/T2 is open: no error detection anymore
	C3/C4 operation signal	Open	Compressor not operating
		Closed	Compressor operating
	C7/C8 fan output	Open	Fan off
		Closed	Fan on
	C9/C10 defrost output	Open	No defrost operation
		Closed	Defrost operation
Input	C5/C6: capacity step	0–10 V	Only necessary for field setting 13(23)–0 = 01 0–10 V capacity control(*)
	T1/T2(†)	Open	No cooling/heating requested
		Closed	Cooling/heating requested

(*) Refer to paragraph "Operation with 0–10 V capacity control" on page 67.
(†) See field setting 12(22)–5.

For EKEQD only			
Output	C1/C2 fan output	Open	Fan off
		Closed	Fan on
Input	T1/T2(*)	Open	No cooling/heating requested
		Closed	Cooling/heating requested

(*) See field setting 12(22)–5.

- The fan of the air handling unit must operate before cooling operation is required to the outdoor unit.
- When the operation signal is activated, the air handling unit and fan must operate. Failure to this will cause a safety to operate or freezing up of the air handling unit.

TROUBLESHOOTING

To set up the system and make trouble shooting possible, it is required to connect the remote control to the option kit.

Not a malfunction of the air conditioner

The system does not operate

- The system does not restart immediately after the cooling/heating is requested.
  If the operation lamp lights, the system is in normal operating condition.
  It does not restart immediately because one of its safety devices actuates to prevent the system from being overloaded. The system will turn on again automatically after 3 minutes.
- The system does not restart immediately after the power supply is turned on.
  Wait 1 minute until the micro computer is prepared for operation.

Trouble shooting

If one of the following malfunctions occurs, take the measures shown below and contact your dealer.

The system must be repaired by a qualified service person.

- If a safety device such as a fuse, a breaker, or an earth leakage breaker frequently actuates, or ON/OFF switch does not properly work.
  Turn off the main power switch.
- If the display TEST, the unit number and the operation lamp flash and the malfunction code appears;
  Notify your dealer and report the malfunction code.

If the system does not operate properly, and none of the above mentioned malfunctions is evident, investigate the system according to the following procedures.

If the system does not operate at all

- Check if there is a power failure.
  Wait until power is restored. If power failure occurs during operation, the system automatically restarts immediately after the power supply recovers.
- Check if the fuse has blown or breaker has been tripped.
  Change the fuse or set the breaker.

If the system stops operating after operation is complete

- Check if the air inlet or outlet of outdoor or air handling unit is blocked by obstacles.
  Remove the obstacle and make it well-ventilated.
- Check if the air filter is clogged.
  Ask a qualified service person to clean the air filter.
- The error signal is given and the system stops.
  If the error resets after 5-10 minutes, the unit safety device was activated but the unit restarted after evaluation time.
  If the error persists, contact your dealer.

If the system operates but it does not sufficiently cool/heat

- Check if the air inlet or outlet of the air handling unit or the outdoor unit is blocked with obstacles.
  Remove the obstacle and make it well-ventilated.
- Check if the air filter is clogged.
  Ask a qualified service person to clean the air filter.
- Check if the doors or the windows are open.
  Shut doors or windows to prevent wind from coming in.
- Check if direct sunlight enters the room.
  Use curtains or blinds.
- Check if there are too many inhabitants in the room.
  Cooling effect decreases if heat gain of the room is too large.
- Check if the heat source of the room is excessive.
  Cooling effect decreases if heat gain of the room is too large.

The air handling unit is freezing up

- The liquid thermistor (R2T) is not put on the coldest position and part of the air handling unit is freezing up.
  Thermistor must be put on the coldest position.
- The thermistor has come loose.
  The thermistor must be fixed.
- The air handling unit fan is not operating continuously.
  When the outdoor unit stops operating, the air handling unit fan must continue operation to melt the ice that was accumulated during outdoor unit operation.
  Ensure that the air handling unit fan keeps operating.

In these cases, contact your dealer.

MAINTENANCE

- Only a qualified service person is allowed to perform maintenance.
- Before obtaining access to terminal devices, all power supply circuits must be interrupted.
- Water or detergent may deteriorate the insulation of electronic components and result in burn-out of these components.

DISPOSAL REQUIREMENTS

Dismantling of the unit, treatment of the refrigerant, of oil and of other parts must be done in accordance with relevant local and national legislation.

NOTES

6. System B: EKEQM-box: Installation and Operation Manual

INSTALLATION AND OPERATION MANUAL

Option kit for combination of Daikin condensing units with field supplied air handling units

Installation and operation manual
Option kit for combination of Daikin condensing units with field supplied air handling units — **English**

Installations- und Bedienungsanleitung
Erweiterungsbausatz für die Verbindung von Daikin-Verflüssigern mit bauseitigen Luftbehandlungsgeräten — **Deutsch**

Manuel d'installation et d'utilisation
Kit d'options pour combinaison de groupes condenseur Daikin et unités de traitement de l'air non fournies — **Français**

Montagehandleiding en gebruiksaanwijzing
Optiekit voor combinatie van condensorunits van Daikin met lokaal geleverde luchtbehandelingsunits — **Nederlands**

Manual de instalación y operación
Kit de opciones para la combinación de unidades de condensación Daikin con unidades de tratamiento de aire suministradas — **Español**

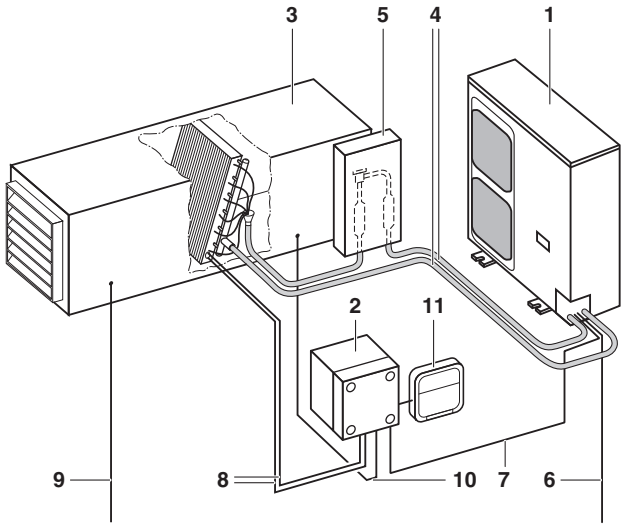
Manuale di installazione e d'uso
Kit opzioni per la combinazione di unità di condensazione Daikin con unità per il trattamento dell'aria non in dotazione — **Italiano**

Manual de instalação e de funcionamento
Kit de opções para combinação de unidades de condensação Daikin com unidades de tratamento de ar existentes no local — **Portugues**

Инструкция по монтажу и эксплуатации
Комплект дополнительного оборудования для подключения конденсаторных агрегатов Daikin к приобретаемым на внутреннем рынке — **русский**

Instrukcja montażu i instrukcja obsługi
Zestawy opcji dla agregatów skraplających Daikin w konfiguracji z centralami klimatyzacyjnymi dostarczanymi osobno — **polski**

EKEQMCBV3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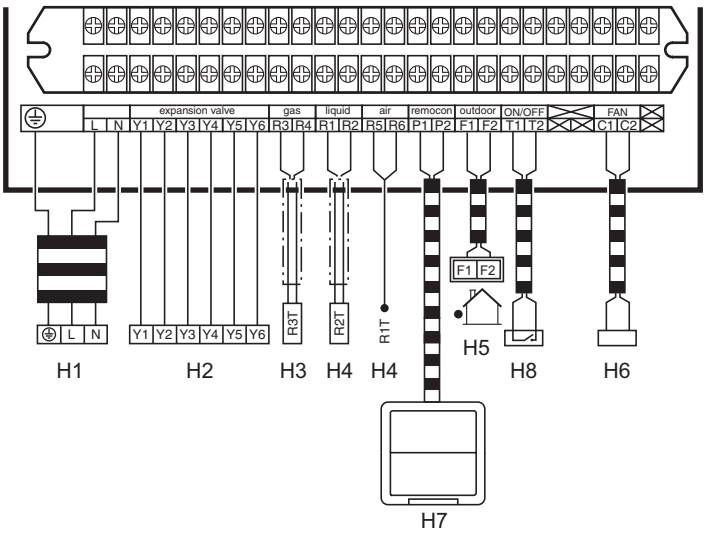
expansion valve
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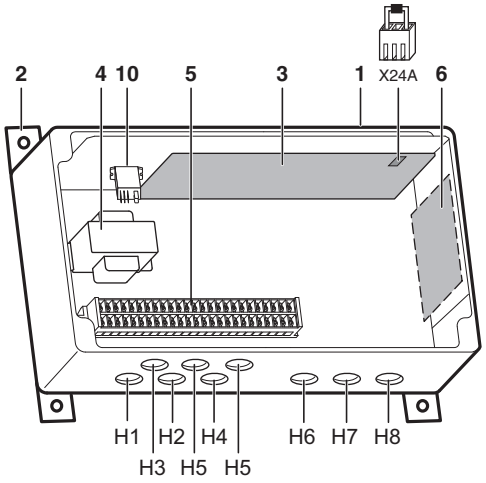
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3

NOTES

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READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLATION AND OPERATION.

IMPROPER INSTALLATION OR ATTACHMENT OF EQUIPMENT OR ACCESSORIES COULD RESULT IN ELECTRIC SHOCK, SHORT-CIRCUIT, LEAKS, FIRE OR OTHER DAMAGE TO THE EQUIPMENT. BE SURE ONLY TO USE ACCESSORIES MADE BY DAIKIN WHICH ARE SPECIFICALLY DESIGNED FOR USE WITH THE EQUIPMENT AND HAVE THEM INSTALLED BY A PROFESSIONAL.

IF UNSURE OF INSTALLATION PROCEDURES OR USE, ALWAYS CONTACT YOUR DAIKIN DEALER FOR ADVICE AND INFORMATION.

The English text is the original instruction. Other languages are translations of the original instructions.

INTRODUCTION

- Do only use this system in combination with a field supplied air handling unit. Do not connect this system to other appliances.
- Only optional controls as listed in the optional accessories list can be used.

BEFORE INSTALLATION

The system will operate as a standard indoor unit to control the room temperature. This system does not require a specific external controller but take below cautions into account.

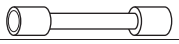
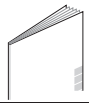
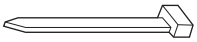
- Multiple outdoor unit connections are not allowed in 1 refrigerant system.
- The automatic refrigerant charging and leak detection function are not possible when the EKEQMCB is used.
- The manufacturer of this outdoor unit has limited responsibility for total performance of the system because performance is determined by the total system. The discharge air may fluctuate depending on selected air handling unit and depending on the installation configuration.
- Do NOT connect the system to DIII-net devices:
  - intelligent touch Controller
  - intelligent Manager
  - DMS-IF
  - BACnet Gateway
  - ...

  This could result in malfunction or breakdown of the total system.
- This equipment is not designed for year-round cooling applications with low indoor humidity conditions, such as Electronic Data Processing rooms.
- This appliance is not intended for use by persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
  Children should be supervised to ensure that they do not play with the appliance.

INSTALLATION

- For installation of the air handling unit, refer to the air handling unit installation manual.
- Never operate the air conditioner with the discharge pipe thermistor (R3T), suction pipe thermistor (R2T) and pressure sensors (S1NPH, S1NPL) removed. Such operation may burn out the compressor.
- The equipment is not intended for use in a potentially explosive atmosphere.

ACCESSORIES

		Quantity
Thermistor (R1T)		1
Thermistor (R3T/R2T) (2.5 m cable)		2
Insulation sheet		2
Rubber sheet		2
Wire to wire splice		6
Installation and operation manual		1
Screw nut		9
Tie wrap		6
Capacity setting adapter		8
Stopper (closing cup)		1

Obligatory accessory

	EKEQMCB
Expansion valve kit	EKEXV

Refer to chapter "Valve kit installation" for installation instructions.

Optional accessories

		EKEQMCB
remote control		1

NAME AND FUNCTION OF PARTS (See figure 1)

Parts and components

1 Outdoor unit
2 Control box
3 Air handling unit (field supply)
4 Field piping (field supply)
5 Expansion valve kit

Wiring connections

6 Outdoor unit power supply
7 Control box wiring
(Power supply and communication between control box and outdoor unit)
8 Air handling unit thermistors
9 Power supply and control wiring for air handling unit and controller (power supply is separate from the outdoor unit)
10 Air thermistor control for air handling unit
11 remote control

BEFORE INSTALLATION

- Refer to the installation manual of the outdoor unit for details on refrigerant piping, additional refrigerant charging, and inter-unit wiring.

Since design pressure is 4 MPa or 40 bar, pipes of larger wall thickness may be required. Refer to paragraph "Selection of piping material" on page 76.

- Precautions for R410A
  - The refrigerant requires strict cautions for keeping the system clean, dry and tight.
    - Clean and dry
      Foreign materials (including mineral oils or moisture) should be prevented from getting mixed into the system.
    - Tight
      Read "Piping installation" on page 75 carefully and follow these procedures correctly.
  - Since R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. (If the refrigerant is in state of gas, its composition changes and the system will not work properly).
  - The connected air handling units must have heat exchangers designed exclusively for R410A.

Cautions for selection of the air handling unit

Select the air handling unit (field supply) according to the technical data and limitations mentioned in Table 1.

Lifetime of the outdoor unit, operation range or operation reliability may be influenced if you neglect these limitations.

This control box can only be used in heat pump applications.

NOTE

- For maximum number of indoor units, see the outdoor unit specifications.
- If the total capacity of the connected indoor units exceeds the capacity of the outdoor unit, cooling and heating performance may drop when running the indoor units.
  Refer to the section on performance characteristics in the Engineering Data Book for details.
- The capacity class of the air handling unit is determined by the selection of the expansion valve kit according to Table 1.

Depending on the heat exchanger, a connectable EKEXV (expansion valve kit) must be selected to these limitations.

Table 1

EKEXV class	Allowed heat exchanger volume (dm^3)		Allowed heat exchanger capacity (kW)	
	Minimum	Maximum	Minimum	Maximum
50	0.76	1.65	5.0	6.2
63	1.66	2.08	6.3	7.8
80	2.09	2.64	7.9	9.9
100	2.65	3.30	10.0	12.3
125	3.31	4.12	12.4	15.4
140	4.13	4.62	15.5	17.6
200	4.63	6.60	17.7	24.6
250	6.61	8.25	24.7	30.8

Saturated suction temperature (SST) = 6°C, SH (superheat) = 5 K, air temperature = 27°C DB / 19°C WB.

1 The air handling unit can be connected as a standard indoor unit to the outdoor unit. The limitations of connection are determined by the outdoor unit.

Additional limits exist when connecting the EKEQMCB control box. These can be found in the technical data book of the EKEQMCB and in this manual.

2 Selecting the expansion valve

The corresponding expansion valve needs to be selected for your air handling unit. Select the expansion valve according to the above limitations.

NOTE

- If conflicting result, capacity selection has priority over volume.
- The expansion valve is an electronic type, it is controlled by the thermistors that are added in the circuit. Each expansion valve can control a range of air handling units sizes.
- The selected air handling unit must be designed for R410A.
- Extraneous substances (including mineral oils or moisture) must be prevented from getting mixed into the system.
- SST: saturated suction temperature at exit of air handling unit.

3 Selecting the capacity setting adapter (see accessories)

- The corresponding capacity setting adapter needs to be selected depending on the expansion valve.
- Connect the correct selected capacity setting adapter to X24A (A1P). (See figure 3)

EKEXV kit	Capacity setting adapter label (indication)
50	J56
63	J71
80	J90
100	J112

EKEXV kit	Capacity setting adapter label (indication)
125	J140
140	J160
200	J224
250	J280

For the following items, take special care during construction and check after installation is finished

Tick ✓ when checked	
☐	Are the thermistors fixed firmly? Thermistor may come loose.
☐	Is the freeze-up setting done correctly? The air handling unit may freeze up.
☐	Is the control box fixed firmly? The unit may drop, vibrate or make noise.
☐	Do electrical connections comply with specifications? The unit may malfunction or components may burn out.
☐	Are wiring and piping correct? The unit may malfunction or components may burn out.
☐	Is the unit safely grounded? Dangerous at electric leakage.

SELECTING THE INSTALLATION SITE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Select an installation site where the following conditions are fulfilled and that meets your customer's approval.

- The option boxes (expansion valve and electrical control box) can be installed inside and outside.
- Do not install the option boxes in or on the outdoor unit.
- Do not put the option boxes in direct sunlight. Direct sunlight will increase the temperature inside the option boxes and may reduce its lifetime and influence its operation.
- Choose a flat and strong mounting surface.
- Operating temperature of the control box is between –10°C and 40°C.
- Keep the space in front of the boxes free for future maintenance.
- Keep air handling unit, power supply wiring and transmission wiring at least 1 m away from televisions and radios. This is to prevent image interference and noise in those electrical appliances. (Noise may be generated depending on the conditions under which the electric wave is generated, even if 1 m is kept.)
- Make sure the control box is installed horizontally. Screw nuts position must be downwards.

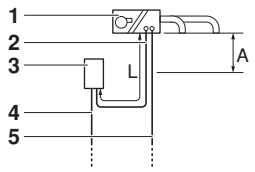
Precautions

Do not install or operate the unit in rooms mentioned below.

- Where mineral oil, like cutting oil is present.
- Where the air contains high levels of salt such as air near the ocean.
- Where sulphurous gas is present such as that in areas of hot spring.
- In vehicles or vessels.
- Where voltage fluctuates a lot such as that in factories.
- Where high concentration of vapor or spray are present.
- Where machines generating electromagnetic waves are present.
- Where acidic or alkaline vapor is present.
- The option boxes must be installed with entrances downward.

PIPING INSTALLATION

Piping limits



1 Air handling unit

2 Connection pipe from expansion valve kit to air handling unit

3 Valve kit

4 Liquid pipe

5 Gas pipe

	Max (m)
A	–5/+5(*)
L	5

(*) Below or above the valve kit.

L is to be considered as a part of the total maximum piping length. See installation manual of the outdoor unit for piping installation.

Piping connections

Make sure to install gas and liquid pipe diameters in function of the air handling unit capacity class.

Air handling unit capacity class	Gas pipe	Connection pipe Liquid pipe
50	Ø12.7	Ø6.4
63	Ø15.9	Ø9.52
80		
100		
125		
140		
200	Ø19.1	
250	Ø22.2	

Selection of piping material

1. Foreign materials inside pipes (including oils for fabrication) must be 30 mg/10 m or less.
2. Use the following material specification for refrigerant piping:
   - Construction material: phosphoric acid deoxidized seamless copper for refrigerant.
   - Temper grade: use piping with temper grade in function of the pipe diameter as listed in the table below.

Pipe Ø	Temper grade of piping material
≤ 15.9	O
≥ 19.1	1/2H

O = Annealed
1/2H = Half hard

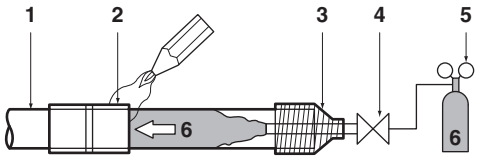
   - The pipe thickness of the refrigerant piping should comply with relevant local and national regulations. The minimal pipe thickness for R410A piping must be in accordance with the table below.

Pipe Ø	Minimal thickness t (mm)
6.4	0.80
9.5	0.80
12.7	0.80
15.9	0.99
19.1	0.80
22.2	0.80

3. In case the required pipe sizes (inch sizes) are not available, it is also allowed to use other diameters (mm sizes), taken the following into account:
   - select the pipe size nearest to the required size.
   - use the suitable adapters for the change-over from inch to mm pipes (field supply).

Cautions for brazing

- Be sure to carry out a nitrogen blow when brazing.
  Brazing without carrying out nitrogen replacement or releasing nitrogen into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.
- When brazing while inserting nitrogen into the piping, nitrogen must be set to 0.02 MPa with a pressure-reducing valve (=just enough so that it can be felt on the skin).



1 Refrigerant piping
2 Part to be brazed
3 Taping
4 Hands valve
5 Pressure-reducing valve
6 Nitrogen

- For details, see manual of the outdoor unit.

VALVE KIT INSTALLATION

Mechanical installation

1 Remove the valve kit box cover by unscrewing 4x M5.

2 Drill 4 holes on correct position (measurements as indicated in figure below) and fix the valve kit box securely with 4 screws through the provided holes Ø9 mm.

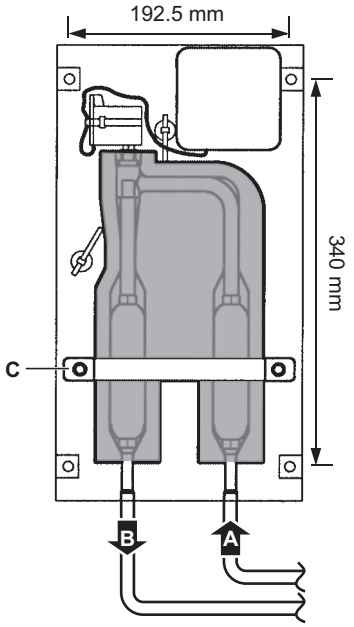
NOTE

- Make sure that the expansion valve is installed vertically.
- Make sure there is enough free space for future maintenance.

Brazing work

For details, see manual of the outdoor unit.

3 Prepare the inlet/outlet field piping just in front of the connection (do **not** braze yet).



A Inlet coming from the outdoor unit

B Outlet to air handling unit

C Pipe fixing clamp

4 Remove the pipe fixing clamp (C) by unscrewing 2x M5.

5 Remove the upper and lower pipe insulations.

6 Braze the field piping.

- Make sure to cool the filters and valve body with a wet cloth and make sure the body temperature does not exceed 120°C during brazing.
- Make sure that the other parts such as electrical box, tie wraps and wires are protected from direct brazing flames during brazing.

7 After brazing, put the lower pipe insulation back in place and close it with the upper insulation cover (after pealing off the liner).

8 Secure the pipe fixing clamp (C) in place again (2x M5).

9 Make sure that field pipes are fully insulated.

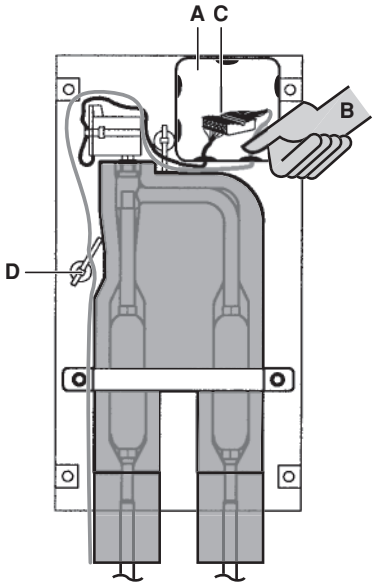
Field pipe insulation must reach up to the insulation you have put back in place as per procedure step 7. Make sure that there is no gap between both ends in order to avoid condensation dripping (finish the connection with tape eventually).

Electrical work

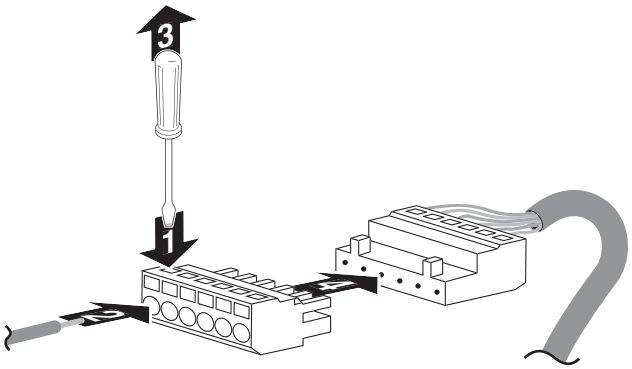
1 Open the electrical box cover (A).

2 Push out **ONLY** the second lower wire intake hole (B) from inside to outside. Do not damage the membrane.

3 Pass valve cable (with wires Y1 ... Y6) from the control box through that membrane wire intake hole and connect the cable wires into the terminal connector (C) following instructions as described in step 4. Route the cable out of the valve kit box according to figure below and fix with the tie wrap (D). See "Electric wiring work" on page 78 for more details.



4 Use a small screwdriver and follow indicated instructions for connecting cable wires into the terminal connector according to the wiring diagram.



5 Make sure that field wiring and insulation is not squeezed when closing the valve kit box cover.

6 Close the valve kit box cover (4x M5).

INSTALLATION OF THE ELECTRICAL CONTROL BOX (See figure 3)

1 Control box
2 Hanger brackets
3 Main PCB
4 Transformer
5 Terminal
6 Optional PCB (KRP4)

Mechanical installation

1 Fix the control box with its hanger brackets to the mounting surface.
Use 4 screws (for holes of Ø6 mm).

2 Open the lid of the control box.

3 For electrical wiring: refer to paragraph "Electric wiring work" on page 78.

4 Install the screw nuts.

5 Close the unnecessary openings with stoppers (closing cups).

6 Close the lid securely after installation to ensure that the control box is watertight.

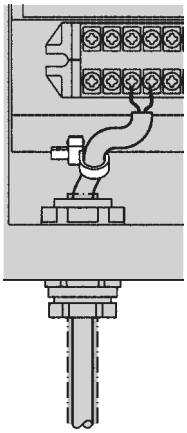
ELECTRIC WIRING WORK

- All field supplied parts and materials and electric works must be conform to local codes.
- Use copper wire only.
- All wiring must be performed by an authorized electrician.
- A main switch or other means for disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with relevant local and national legislation.
- Refer to the installation manual attached to the outdoor unit for the size of power supply electric wire connected to the outdoor unit, the capacity of the circuit breaker and switch, wiring and wiring instructions.
- Attach the earth leakage circuit breaker and fuse to the power supply line.

Connection of the wires inside the control box

1 For connection to outdoor unit and to controller (field supply):
Pull the wires inside through the screw nut and close the nut firmly in order to ensure a good pull relieve and water protection.

2 The cables require an additional pull-relief. Strap the cable with the installed tie wrap.



Precautions

- Thermistor cable and remote control wire should be located at least 50 mm away from power supply wires and from wires to the controller. Not following this guideline may result in malfunction due to electrical noise.
- Use only specified wires, and tightly connect wires to the terminals. Keep wiring in neat order so that it does not obstruct other equipment. Incomplete connections could result in overheating, and in worse case electric shock or fire.

Connecting the wiring: EKEQMCBV3

- Connect the wires to the terminal board according to the wiring diagram in figure 2. See figure 3 for wiring intake in the control box. The wiring intake hole indication H1 refers to the H1 cable of the corresponding wiring diagram. There are 2 wiring intake holes to allow for branching of the communication wire.
- Connect cables according to specifications of the next table.

Table connection and application

	Description	Connect to	Type of cable	Cross section (mm^2)(*)	Maximum length (m)	Specifications
L, N, earth	Power supply	Power supply	H05VV-F3G2.5	2.5	—	Power supply 230 V 1~ 50 Hz
Y1~Y6	Expansion valve connection	Expansion valve kit	LIYCY3 x 2 x 0.75	0.75	20	Digital output 12 V DC
R1,R2	Thermistor R2T (liquid pipe)	—	H05VV-F2 x 0.75		Standard: 2.5 Max.: 20	Analog input 16 V DC
R3,R4	Thermistor R3T (gas pipe)					
R5,R6	Thermistor R1T (air)					
P1,P2	Remote control				100	Communication line 16 V DC
F1,F2	Communication to outdoor unit	Outdoor unit				
T1,T2	ON/OFF	Controller field supply			—	Digital input 16 V DC
—	Capacity step		LIYCY4 x 2 x 0.75	Optional connection: when the function of the switch box needs to be extended: see KRP4A51 for details of settings and instructions.		
—	Error signal					
—	Operation signal					
C1,C2	Fan signal	Air handling unit fan field supply	H05VV-F3G2.5	2.5	—	Digital output: voltage free. Maximum 230 V, maximum 2 A

(*) Recommended size (all wiring must comply with local codes).

Wiring diagram

A1P.....Printed circuit board
A2P.....Printed circuit board (option KRP4)
F1U.....Fuse (250 V, F5A)(A1P)
F3U.....Field fuse
HAP .....Light emitting diode (service monitor-green)
K1R.....Magnetic relay
K4R.....Magnetic relay (fan)
Q1DI .....Earth leakage breaker
R1T .....Thermistor (air)
R2T.....Thermistor (liquid)
R3T.....Thermistor (gas)
R7 .....Capacity adapter
T1R.....Transformer (220 V/21.8 V)
X1M,X3M.....Terminal block
Y1E.....Electronic expansion valve
X1M-C1/C2.....Output: fan ON/OFF
X1M-F1/F2.....Communication outdoor unit
X1M-P1/P2 .....Communication remote control
X1M-R1/R2.....Thermistor liquid
X1M-R3/R4.....Thermistor gas
X1M-R5/R6.....Thermistor air
X1M-T1/T2.....Input: ON/OFF
X1M-Y1~6 .....Expansion valve

::■■■:: ..... Field wiring
L..... Live
N ..... Neutral
⊡, —■›— ..... Connector
◦ ..... Wire clamp
⏚ ..... Protective earth (screw)
—·— ..... Separate component
═:═ ..... Optional accessory
BLK..... Black
BLU..... Blue
BRN ..... Brown
GRN..... Green
GRY ..... Gray
ORG ..... Orange
PNK ..... Pink
RED ..... Red
WHT ..... White
YLW ..... Yellow

INSTALLATION OF THERMISTORS

Refrigerant thermistors

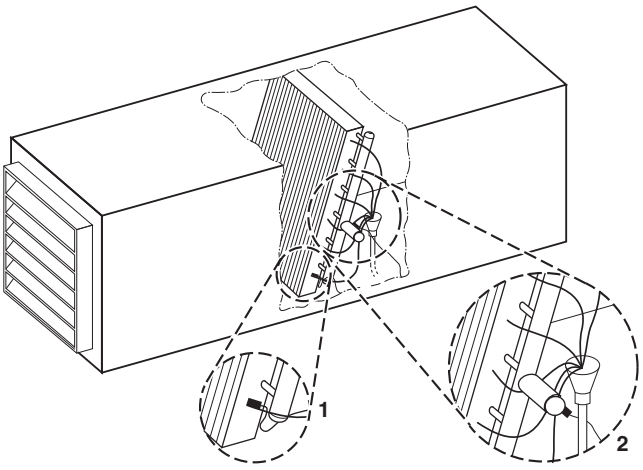
Location of the thermistor

A correct installation of the thermistors is required to ensure a good operation:

1. Liquid (R2T)
   Install the thermistor behind the distributor on the coldest pass of the heat exchanger (contact your heat exchanger dealer).
2. Gas (R3T)
   Install the thermistor at the outlet of the heat exchanger as close as possible to the heat exchanger.

Evaluation must be done to check if the air handling unit is protected against freeze-up.

Execute test operation and check for freeze-up.



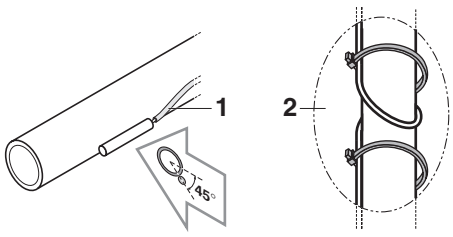
1 Liquid R2T

2 Gas R3T

Installation of the thermistor cable

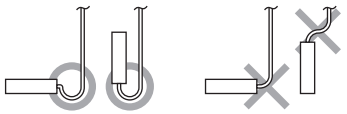
1 Put the thermistor cable in a separate protective tube.

2 Always add a pull-relief to the thermistor cable to avoid strain on the thermistor cable and loosening of the thermistor. Strain on the thermistor cable or loosening of the thermistor may result in bad contact and incorrect temperature measurement.

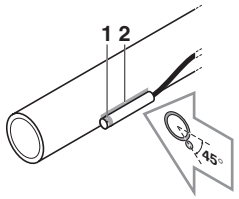


Fixation of the thermistor

- Put the thermistor wire slightly down to avoid water accumulation on top of the thermistor.



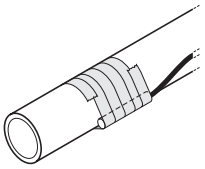
- Make good contact between thermistor and air handling unit. Put the top of the thermistors on the air handling unit, this is the most sensitive point of the thermistor.



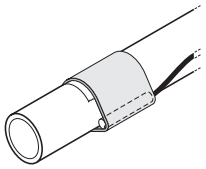
1 Most sensitive point of the thermistor

2 Maximize the contact

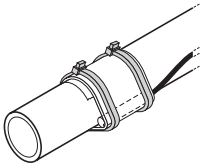
1 Fix the thermistor with insulating aluminum tape (field supply) in order to ensure a good heat transference.



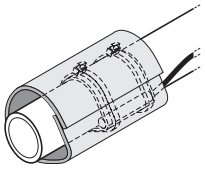
2 Put the supplied piece of rubber around the thermistor (R2T/R3T) in order to avoid loosening of the thermistor after some years.



3 Fasten the thermistor with 2 tie wraps.



4 Insulate the thermistor with the supplied insulation sheet.



Air thermistor

The air thermistor (R1T) can be installed either in the room that needs temperature control or in the suction area of the air handling unit.

NOTE For room temperature control the delivered thermistor (R1T) can be replaced by an optional remote sensor kit KRCS01-1(A) (to be ordered separately).

Installation of longer thermistor cable (R1T/R2T/R3T)

The thermistor is supplied with a standard cable of 2.5 m. This cable can be made longer to up to 20 m.

Install the longer thermistor cable with the delivered wire to wire splices

1 Cut the wire or bundle the remainder of the thermistor cable.
Keep at least 1 m of the original thermistor cable.
Do not bundle the cable inside the control box.

2 Strip the wire ±7 mm at both ends and insert these ends into the wire to wire splice.

3 Pinch the splice with the correct crimp tool (pliers).

4 After connection, heat up the shrink-insulation of the wire to wire splice with a shrink-heater to make a water tight connection.

5 Wrap electrical insulation tape around the connection.

6 Put a pull-relief in front of and behind the connection.

- The connection must be made on an accessible location.
- To make the connection waterproof, the connection can also be made in a switch box or connector box.
- The thermistor cable should be located at least 50 mm away from power supply wire. Not following this guideline may result in malfunction due to electrical noise.

REFRIGERANT PIPING WORK

All field piping must be provided by a licensed refrigeration technician and must comply with the relevant local and national codes.

- For refrigerant piping of outdoor unit, refer to the installation manual supplied with the outdoor unit.
- Follow the outdoor unit specifications for additional charging, piping diameter and installation.
- The maximum allowed piping length depends on the connected outdoor model.

TEST OPERATION

Before executing "test operation" as well as before operating the unit, you must check the following:

- Refer to the section of "For the following items, take special care during construction and check after installation is finished" on page 75.
- After finishing the construction of refrigerant piping, drain piping and electric wiring, conduct test operation accordingly to protect the unit.
- Open the gas side stop valve.
- Open the liquid side stop valve.

Executing the test operation

1 Close the contact T1/T2 (ON/OFF).

2 Confirm function of the unit according to the manual and check if the air handling unit has collected ice (freeze-up).
If the unit collects ice: see "Troubleshooting" on page 82.

3 Confirm that the fan of the air handling unit is ON.

- In case of poor distribution in the air handling unit, 1 or more passes of the air handling unit may freeze-up (collect ice) → put the thermistor (R2T) on this position.
- Depending on operation conditions (e.g.: outdoor ambient temperature) it is possible that the settings must be changed after commissioning.

OPERATION AND MAINTENANCE

If T1/T2 is applicable:

- Closing the T1/T2 signal starts operation of the air handling unit.
- Opening the T1/T2 signal stops operation of the air handling unit.

WHAT TO DO BEFORE OPERATION

- Before initiating operation, contact your dealer to get the operation manual that corresponds to your system.
- Refer to the dedicated manual of the controller (field supply) and air handling unit (field supply).
- Make sure that the air handling unit fan is ON when the outdoor unit is in normal operation.

Field settings for EKEQMCB

Refer to the installation manuals of both the outdoor unit and the remote control.

Operation setting in case of power failure

Measures must be taken to ensure that after power failure, T1/T2 is according to the setting of your preference. Neglecting this caution will result in improper operation.

Mode No.	Code No.	Description of setting
12(22)–5	01	T1/T2 must be open at power restore.(*)
	02	After power failure, the status of T1/T2 must remain identical to the initial T1/T2 status prior to the power failure.

(*) After power failure, T1/T2 must be changed to open (no cooling/heating requested).

OPERATION AND DISPLAY SIGNALS

Input	T1/T2(*)	Open	No cooling/heating requested
		Closed	Cooling/heating requested

(*) See field setting 12(22)–5.

NOTE

- See the remote control display for output.
- See optional kit KRP4A51 for additional possible signals.

When the operation signal is activated, the air handling unit and fan must operate. Failure to this will cause a safety to operate or freezing up of the air handling unit.

TROUBLESHOOTING

To set up the system and make trouble shooting possible, it is required to connect the remote control to the option kit.

Not a malfunction of the air conditioner

The system does not operate

- The system does not restart immediately after the cooling/heating is requested.
  If the operation lamp lights, the system is in normal operating condition.
  It does not restart immediately because one of its safety devices actuates to prevent the system from being overloaded. The system will turn on again automatically after 3 minutes.
- The system does not restart immediately after the power supply is turned on.
  Wait 1 minute until the micro computer is prepared for operation.

Trouble shooting

If one of the following malfunctions occurs, take the measures shown below and contact your dealer.

The system must be repaired by a qualified service person.

- If a safety device such as a fuse, a breaker, or an earth leakage breaker frequently actuates, or ON/OFF switch does not properly work.
  Turn off the main power switch.
- If the display TEST, the unit number and the operation lamp flash and the malfunction code appears;
  Notify your dealer and report the malfunction code.

If the system does not operate properly, and none of the above mentioned malfunctions is evident, investigate the system according to the following procedures.

If the system does not operate at all

- Check if there is a power failure.
  Wait until power is restored. If power failure occurs during operation, the system automatically restarts immediately after the power supply recovers.
- Check if the fuse has blown or breaker has been tripped.
  Change the fuse or set the breaker.

If the system stops operating after operation is complete

- Check if the air inlet or outlet of outdoor or air handling unit is blocked by obstacles.
  Remove the obstacle and make it well-ventilated.
- Check if the air filter is clogged.
  Ask a qualified service person to clean the air filter.
- The error signal is given and the system stops.
  If the error resets after 5-10 minutes, the unit safety device was activated but the unit restarted after evaluation time.
  If the error persists, contact your dealer.

If the system operates but it does not sufficiently cool/heat

- Check if the air inlet or outlet of the air handling unit or the outdoor unit is blocked with obstacles.
  Remove the obstacle and make it well-ventilated.
- Check if the air filter is clogged.
  Ask a qualified service person to clean the air filter.
- Check if the doors or the windows are open.
  Shut doors or windows to prevent wind from coming in.
- Check if direct sunlight enters the room.
  Use curtains or blinds.
- Check if there are too many inhabitants in the room.
  Cooling effect decreases if heat gain of the room is too large.
- Check if the heat source of the room is excessive.
  Cooling effect decreases if heat gain of the room is too large.

The air handling unit is freezing up

- The liquid thermistor (R2T) is not put on the coldest position and part of the air handling unit is freezing up.
  Thermistor must be put on the coldest position.
- The thermistor has come loose.
  The thermistor must be fixed.
- The air handling unit fan is not operating continuously.
  When the outdoor unit stops operating, the air handling unit fan must continue operation to melt the ice that was accumulated during outdoor unit operation.
  Ensure that the air handling unit fan keeps operating.

In these cases, contact your dealer.

MAINTENANCE

- Only a qualified service person is allowed to perform maintenance.
- Before obtaining access to terminal devices, all power supply circuits must be interrupted.
- Water or detergent may deteriorate the insulation of electronic components and result in burn-out of these components.

DISPOSAL REQUIREMENTS

Dismantling of the unit, treatment of the refrigerant, of oil and of other parts must be done in accordance with relevant local and national legislation.

Part 7
Test Operation

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   1.1 Procedure and Outline 84
   1.2 Operation when Power is Turned On 90
2. Outdoor Unit PC Board Layout 91
3. Field Setting 92
   3.1 Field Setting from remote control 92
   3.2 Field Setting from Outdoor Unit 100

1. Test Operation

1.1 Procedure and Outline

Follow the following procedure to conduct the initial test operation after installation.

1.1.1 Check Work Prior to Turn Power Supply On

Check the below items.
- Power wiring
- Control transmission wiring between units
- Earth wire

⇩

Check on refrigerant piping

⇩

Check on amount of refrigerant charge

- ○ Is the power supply single-phase 220-240V / 50Hz?
- ○ Have you finished a ductwork to drain?
- ○ Have you detached transport fitting?
- ○ Is the wiring performed as specified?
- ○ Are the designated wires used?
- ○ Is the grounding work completed?
  Use a 500V megger tester to measure the insulation.
  - Do not use a megger tester for other circuits than 220-240V circuit.
- ○ Are the setscrews of wiring not loose?
- ○ Is the electrical component box covered with an insulation cover completely?

- ○ Is pipe size proper? (The design pressure of this product is 4.0MPa.)
- ○ Are pipe insulation materials installed securely?
  Liquid and gas pipes need to be insulated. (Otherwise causes water leak.)
- ○ Are respective stop valves on liquid and gas line securely open?

- ○ Is refrigerant charged up to the specified amount?
  If insufficient, charge the refrigerant from the service port of stop valve on the liquid side with outdoor unit in stop mode after turning power on.
- ○ Has the amount of refrigerant charge been recorded on “Record Chart of Additional Refrigerant Charge Amount”?

(V3180)

1.1.2 Turn Power On

Turn outdoor unit power on.

⇩

Turn AHU power on.

⇩

Carry out field setting on outdoor PC board

- ○ Be sure to turn the power on 6 hours before starting operation to protect compressors.
- ○ Close outside panels of the outdoor unit.

(V3056)

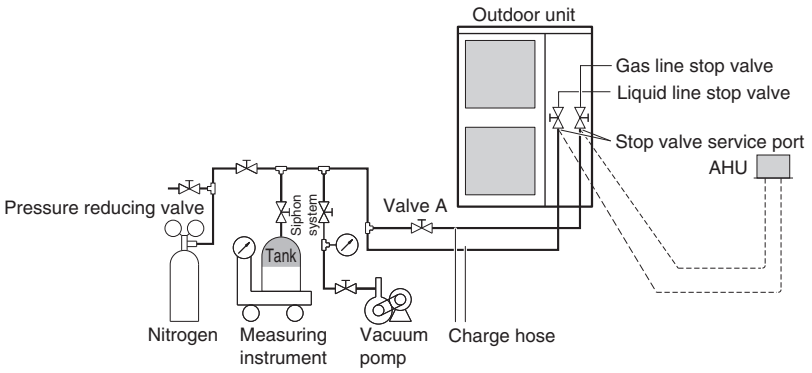
1.1.3 Air Tight Test and Vacuum Drying

- Air tight test: Make sure to use nitrogen gas.
- Pressurize the liquid and gas pipes to 4.0 MPa (40 bar) (do not pressurize more than 4.0 MPa (40 bar)). If the pressure does not drop within 24 hours, the system passes the test. If the pressure drops, check where the nitrogen leaks from.
- Vacuum drying: Use a vacuum pump which can evacuate to –100.7 kPa (5 Torr, –755 mm Hg)
  1. Evacuate the system from the liquid and gas pipes by using a vacuum pump for more than 2 hours and bring the system to –100.7 kPa. After keeping the system under that condition for more than 1 hour, check if the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have leaks.
  2. Following should be executed if there is a possibility of moisture remaining inside the pipe (if piping work is carried out during the raining season or over a long period of time, rainwater may enter the pipe during work).

After evacuating the system for 2 hours, pressurize the system to 0.05 MPa (vacuum break) with nitrogen gas and evacuate the system again using the vacuum pump for 1 hour to –100.7 kPa (vacuum drying). If the system cannot be evacuated to –100.7 kPa within 2 hours, repeat the operation of vacuum break and vacuum drying.
Then, after leaving the system in vacuum for 1 hour, confirm that the vacuum gauge does not rise.

1.1.4 Additional Refrigerant Charge

- Maximum piping length is 55 m. For calculation of additional refrigerant charge, refer to the installation manual.
- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum drying (see above).
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant (R-410A) is charged.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When performing service on the unit requiring the refrigerant system to be opened, refrigerant must be evacuated according to local regulations.
- When the power is on, please close the front panel when leaving the unit.



To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

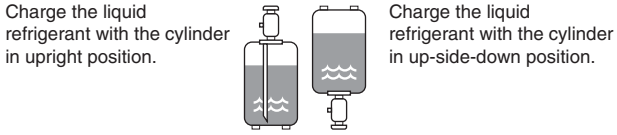
- This outdoor unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant. See Installation manual.
- In case re-charge is required, refer to the nameplate of the unit. The nameplate states the type of refrigerant and necessary amount.

Precautions when adding R-410A

Be sure to charge the specified amount of refrigerant in liquid state to the liquid pipe.

Since this refrigerant is a mixed refrigerant, adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

- Before charging, check whether the refrigerant cylinder is equipped with a siphon tube or not.


Charge the liquid refrigerant with the cylinder in upright position.
Charge the liquid refrigerant with the cylinder in up-side-down position.

Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

Refrigerant type: R-410A

GWP(1) value: 1975

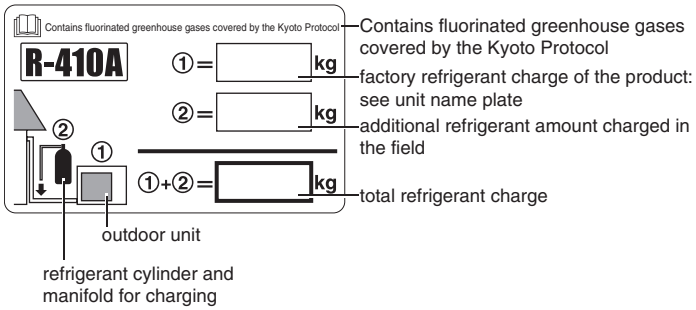
(1) GWP = global warming potential

Please fill in with indelible ink,

- ① the factory refrigerant charge of the product,
- ② the additional refrigerant amount charged in the field and
- ① + ② the total refrigerant charge

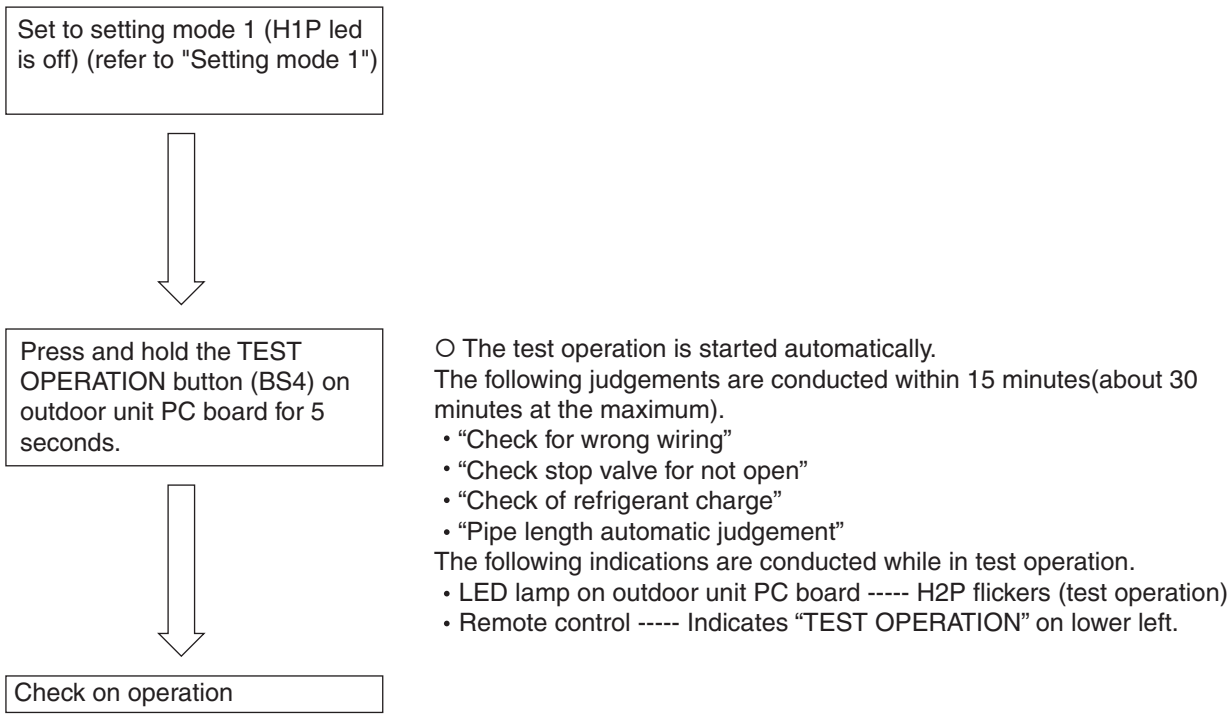
on the refrigerant charge label supplied with the product.

The filled out label must be adhered in the proximity of the product charging port (e.g. onto the inside of the service cover).



1.1.5 Check Operation

* During check operation, mount front panel to avoid the misjudging.
* Check operation is mandatory for normal unit operation.
  (When the check operation is not executed, alarm code "U3" will be displayed.)


Set to setting mode 1 (H1P led is off) (refer to "Setting mode 1")
Press and hold the TEST OPERATION button (BS4) on outdoor unit PC board for 5 seconds.
Check on operation
○ The test operation is started automatically.
The following judgements are conducted within 15 minutes(about 30 minutes at the maximum).
• “Check for wrong wiring”
• “Check stop valve for not open”
• “Check of refrigerant charge”
• “Pipe length automatic judgement”
The following indications are conducted while in test operation.
• LED lamp on outdoor unit PC board ----- H2P flickers (test operation)
• Remote control ----- Indicates “TEST OPERATION” on lower left.

(V3057)

On completion of test operation, LED on outdoor unit PC board displays the following.
H3P ON: Normal completion
H2P ON: Abnormal completion →Check the AHU remote control for abnormal display and correct it.

Malfunction code

In case of an alarm code displayed on remote control:

Malfunction code	Nonconformity during installation	Remedial action
E3	The shutoff valve of an outdoor unit is left closed.	Open the gas-side shutoff valve and the liquid-side shutoff valve.
	Refrigerant overcharge.	Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
E4	The shutoff valve of an outdoor unit is left closed.	Open the gas-side shutoff valve and the liquid-side shutoff valve.
	Insufficient refrigerant.	Check if the additional refrigerant charge has been finished correctly.
		Recalculate the required amount of refrigerant from the piping length and add an adequate amount of refrigerant.
F3	Refrigerant overcharge.	Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
	The shutoff valve of an outdoor unit is left closed.	Open the gas-side shutoff valve and the liquid-side shutoff valve.
	Insufficient refrigerant.	Check if the additional refrigerant charge has been finished correctly.
		Recalculate the required amount of refrigerant from the piping length and add an adequate amount of refrigerant.
F6	Refrigerant overcharge	Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
U1	Power supply cables are connected in the reverse phase instead of the normal phase.	Connect the power supply cables in normal phase. Change any two of the three power supply cables (L1, L2, L3) to correct phase.
U2	Insufficient supply voltage	Check to see if the supply voltage is supplied properly.
U3	If a check operation has not been performed.	Perform a check operation.
U4	No power is supplied to an outdoor unit.	Turn the power on for the outdoor unit.
UA	If no dedicated AHU is being used.	Check the AHU. If it is not a dedicated unit, replace the AHU.
UF	The shutoff valve of an outdoor unit is left closed.	Open the gas-side shutoff valve and the liquid-side shutoff valve.
	If the right AHU piping and wiring are not properly connected to the outdoor unit.	Make sure that the right AHU piping and wiring are properly connected to the outdoor unit.
UH	If the interunit wiring has not be connected or it has shorted.	Make sure the interunit wiring is correctly attached to terminals (X2M) F1/F2 (TO IN/D UNIT) on the outdoor unit circuit board.

1.1.6 Confirmation on Normal Operation

- Conduct normal unit operation after the check operation has been completed.
  (When outdoor air temperature is 24°CDB or higher, the unit can not be operated with heating mode. See the installation manual attached.)
- Confirm that the AHU/outdoor units can be operated normally.
  (When an abnormal noise due to liquid compression by the compressor can be heard, stop the unit immediately, and turn on the crankcase heater to heat up it sufficiently, then start operation again.)
- Operate AHU one by one to check that the corresponding outdoor unit operates.
- Confirm that the AHU discharges cold air (or warm air).

1.2 Operation when Power is Turned On

1.2.1 When Turning On Power First Time

The unit cannot be run for up to 12 minutes to automatically set the master power and address.

Status

Outdoor unit	Test lamp H2P .... Blinks Can also be set during operation described above.
AHU	If ON button is pushed during operation described above, the “UH” malfunction indicator blinks. (Returns to normal when automatic setting is complete.)

1.2.2 When Turning On Power the Second Time and Subsequent

Tap the RESET(BS5) button on the outdoor unit PC board. Operation becomes possible for about 2 minutes. If you do not push the RESET button, the unit cannot be run for up to 10 minutes to automatically set master power.

Status

Outdoor unit	Test lamp H2P .... Blinks Can also be set during operation described above.
AHU	If ON button is pushed during operation described above, the operation lamp lights but the compressor does not operate. (Returns to normal when automatic setting is complete.)

1.2.3 When an AHU or Outdoor Unit has been Added, or AHU or Outdoor Unit PC Board has been Changed

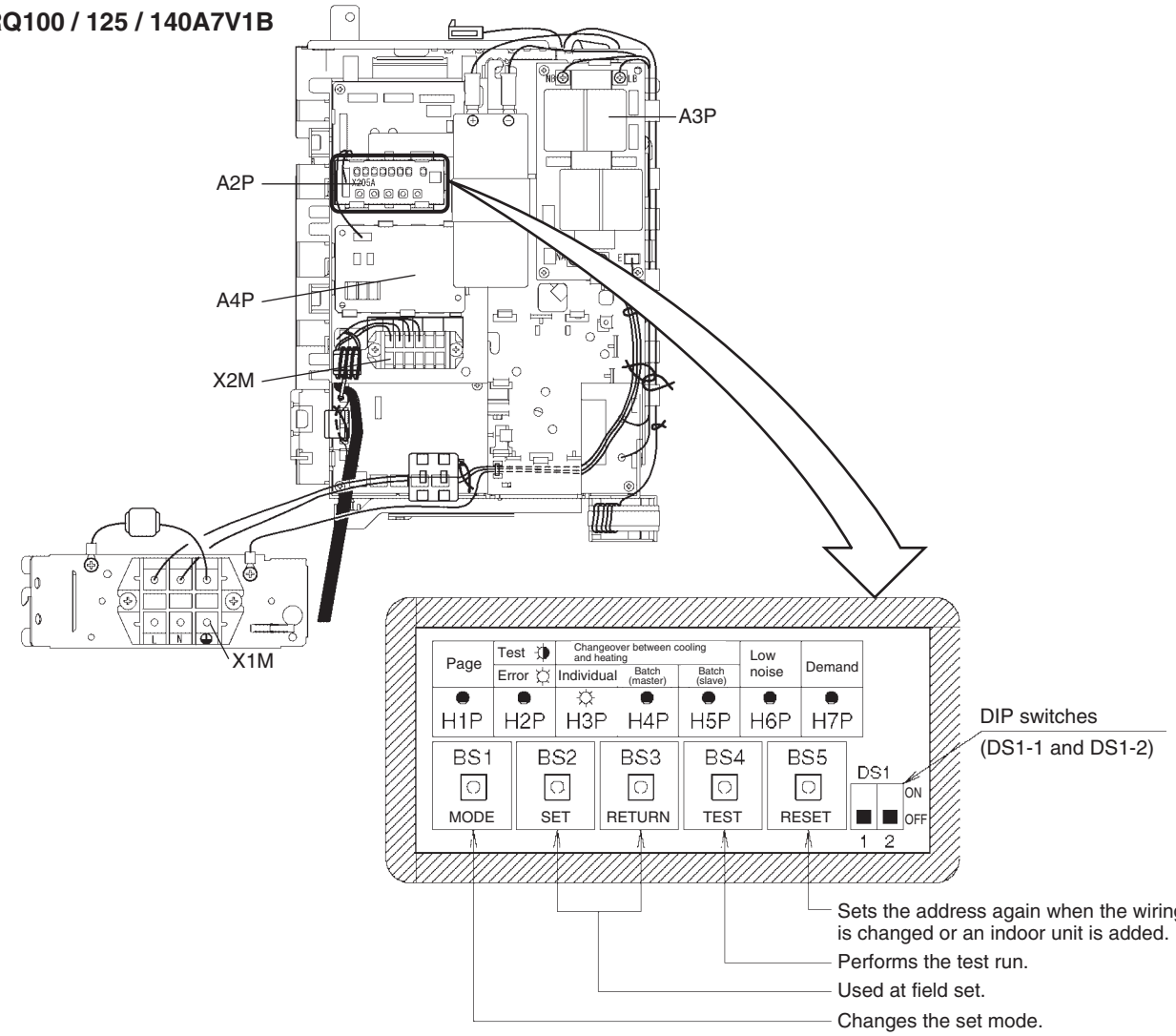
Be sure to push and hold the RESET button for 5 seconds. If not, the addition cannot be recognized. In this case, the unit cannot be run for up to 12 minutes to automatically set the address.

Status

Outdoor unit	Test lamp H2P .... ON Can also be set during operation described above.
AHU	If ON button is pushed during operation described above, the “UH” or “U4” malfunction indicator blinks. (Returns to normal when automatic setting is complete.)

2. Outdoor Unit PC Board Layout

ERQ100 / 125 / 140A7V1B



LED indicator status	● : Turn off	☼ : Turn on	◑ : Flicker	✱ : Turn on or off

(The LED indicator status shown at left indicates the status at factory set.)

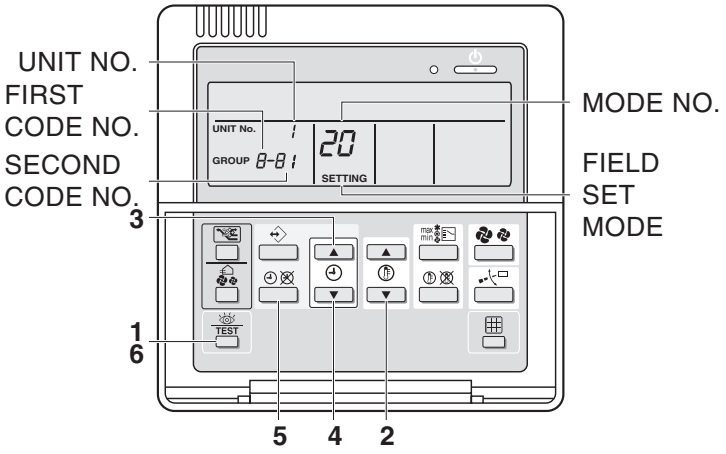
3. Field Setting

3.1 Field Setting from remote control

Individual function of AHU can be changed from the remote control. At the time of installation or after service inspection / repair, make the local setting in accordance with the following description.
Wrong setting may cause malfunction.

3.1.1 Wired remote control

BRC1D528

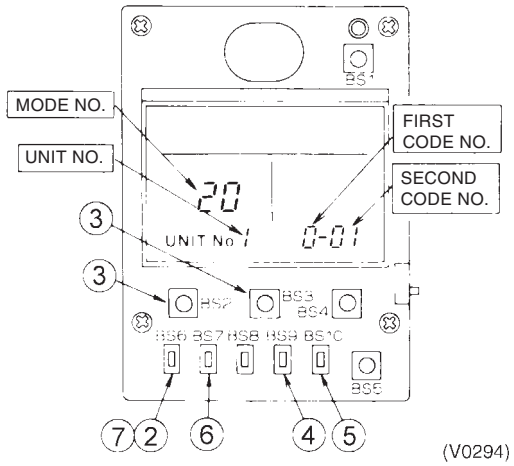


1. When in the normal mode, press the " TEST " button for a minimum of four seconds, and the FIELD SET MODE is entered.
2. Select the desired MODE NO. with the " " button.
3. Push the " " upper button and select FIRST CODE NO.
4. Push the " " lower button and select the SECOND CODE NO.
5. Push the " " button once and the present settings are SET.
6. Push the " TEST " button to return to the NORMAL MODE.

Notes :
1. Do not make any settings not given in the table.
2. Not displayed if the AHU is not equipped with that function.
3. When returning to the normal mode, "88" may be displayed in the LCD in order for the remote control to initialize itself.

3.1.2 Simplified remote control

BRC2C51



1. Remove the upper part of remote control.
2. When in the normal mode, press the [BS6] BUTTON (②) (field set), and the FIELD SET MODE is entered.
3. Select the desired MODE No. with the [BS2] BUTTON (③) (temperature setting ▲) and the [BS3] BUTTON (③) (temperature setting ▼).
4. Push the [BS9] BUTTON (④) (set A) and select FIRST CODE NO.
5. Push the [BS10] BUTTON (⑤) (set B) and select SECOND CODE NO.
6. Push the [BS7] BUTTON (⑥) (set/cancel) once and the present settings are SET.
7. Push the [BS6] BUTTON (⑦) (field set) to return to the NORMAL MODE.

3.1.3 Field Settings - Overview

Note : In the table below, the factory settings are indicated in bold.

Mode n°	Setting	Contents	Second Code n°				Remark
			00	01	02	03	
20 (10)	4	Renewal of target refrigerant control (x-control) (s)		**60**	120	180	1)
	8	System setting		**hp**	c/o	h/o	
22 (12)	3	Fan at thermo off (heating)		ON	ON	**OFF**	
	5	T_1T_2 at power restore		T_1T_2 must be open at power restore	T_1T_2 must be identical to prior to power failure		
23 (13)	0	Control setting EKEQF-box		**x-control**	y-control		
	1	Target refrigerant temperature setting T_e (y-control, cooling)		5	6	7	**1)**
	2	Target refrigerant temperature setting T_c (y-control, heating)		43	44	45	**1)**
	6	Hot start B (min)		0	1	**3**	1)
	7	Hot start A (°C)		34	37	40	**1)**
	8	Fan at defrost & oil return (heating)		**OFF**	ON	ON	
51	0	ΔT_c control (x-control)	30-55	35-55	40-55	43-55	**1)**
	1	ΔT_e control (x-control)	-7-20	-3-20	0-20	3-20	**1)**
	2	Thermo off (y-control, heating) B (min), C (min)	2-3	4-3	6-3	8-3	**1)**
	5	Thermo on (x-control) E (min)	**3**	5	10		
	6	Thermo off (x-control) B (min), C (min)	3-3	**5-3**	7-3	--	1)
	7	Thermo on (x-control, cooling) D (level)	1	--	2	--	**1)**
	8	Thermo off (x-control, cooling) A (level)	**1**	1 or 2			
	9	Thermo off (x-control, heating) A (level)	**5**				1)
	b	Thermo on (x-control, cooling) D (level)	1	**2**	3	4	1)

Remark 1) more settings possible, see “Field Settings”.

3.1.4 Field Settings - Details

(1) System Setting

The ERQ is a heat pump but can be limited to “cooling only” or “heating only” by a setting.

Mode n°	Setting switch n°	Setting position n°	Setting
20 (10)	8	**01**	Heat pump
		02	Cooling only
		03	Heating only

(2) Control Setting for EKEQF-Box

With the EKEQF-box, 2 types of control are possible:

- x-control: with DDC-controller
- y-control: no DDC-controller.

For more information about x-, y-control, refer to “Part 6 Control Box EKEQ - CBV3”.

Mode n°	Setting switch n°	Setting position n°	Setting
23 (13)	0	**01**	x-control
		02	y-control

(3) Indoor Fan Control

In cooling and fan only mode, the indoor fan is in ON-mode when the unit is working.
In heating, different situations are possible.

Mode n°	Setting switch n°	Setting position n°	Setting
22 (12)	3	01	Fan ON at thermo off
		02	Fan ON at thermo off
		03	Fan OFF at thermo off
23 (13)	8	**01**	Fan OFF at defrost and oil return
		02	Fan ON at defrost and oil return
		03	Fan ON at defrost and oil return

Fan off during thermo off and fan on during defrost/oil return will result in fan on during thermo off.

(4) Hot Start

During hot start, fan on is carried out when T_c is A°C or after B minutes.

Mode n°	Setting switch n°	Setting position n°	Setting
23 (13)	7	01	A = 34°C
		02	A = 37°C
		03	A = 40°C
		04	A = 43°C
	6	01	B = 0 min
		02	B = 1 min
		03	B = 3 min
		04	B = 5 min

(5) Thermostat Control

(5.1) X-control

■ **Thermo off**

When the DDC controller maintains level A for more than B minutes, and the thermostat is on, thermo off is carried out for at least C minutes. After C minutes, thermostat on-conditions are checked.

Mode n° setting	Setting switch n°	Setting position n°	Setting
51	8	**00**	level A = 1 (cooling)
		01	level A = 1 or 2 (cooling)
	6	00	B = 3 min, C = 3 min
		01	B = 5 min, C = 3 min
		02	B = 7 min, C = 3 min
		03	--
		04	B = 3 min, C = 5 min
		05	B = 5 min, C = 5 min
		06	B = 7 min, C = 5 min
		07	--
		08	B = 3 min, C = 10 min
		09	B = 5 min, C = 10 min
		10	B = 7 min, C = 10 min
	9	**00**	level A = 5 (heating)
		04	level A = 4 or 5 (heating)

■ **Thermo on**

When the DDC controller reaches level D or higher (lower for heating) and the thermostat is off for at least C minutes (refer to thermo off conditions), thermostat on is carried out for at least E minutes.

Mode n° setting	Setting switch n°	Setting position n°	Setting
51	7	00	D = level 1 (cooling)
		02	D = level 2 (cooling)
		04	D = level 3 (cooling)
		06	D = level 4 (cooling)
		08	D = level 5 (cooling)
	5	**00**	E = 3 min
		01	E = 5 min
		02	E = 10 min
	b	00	D = level 1 (heating)
		01	D = level 2 (heating)
		02	D = level 3 (heating)
		03	D = level 4 (heating)
		04	D = level 5 (heating)

(5.2) Y-control

Cooling: $T_{e\ set} - T_{e\ real} = A$
If A > B for C minutes, thermo off is applied for C minutes.
Heating: $T_{c\ real} - T_{c\ set} = A$
If A > B for C minutes, thermo off is applied for C minutes.

After C minutes, the units starts to operate.

Mode n° setting	Setting switch n°	Setting position n°	Setting	
			B (°C)	C (min)
51	2	00	2	3
		01	4	3
		02	6	3
		03	8	3
		04	2	5
		05	4	5
		06	6	5
		07	8	5
		08	2	7
		09	4	7
		10	6	7
		11	8	7
		12	2	10
		13	4	10
		14	6	10
		15	8	10

(5.3) Z-control

Standard Daikin thermostat on/off control.

(6) Target Refrigerant Temperature Setting

(6.1) X-control

■ **Cooling: Upper & lower limit of T_e can be chosen**

Mode n° setting	Setting switch n°	Setting position n°	Setting	
			Lower limit T_e (°C)	Upper limit T_e (°C)
51	1	00	-7	20
		01	-3	20
		02	0	20
		03	3	20
		04	-7	15
		05	-3	15
		06	0	15
		07	3	15
		08	-7	10
		09	-3	10
		10	0	10
		11	3	10
		12	-7	8
		13	-3	8
		14	0	8
		15	3	8

■ **Heating: Upper & lower limit of T_c can be chosen**

Mode n° setting	Setting switch n°	Setting position n°	Setting	
			Lower limit T_c (°C)	Upper limit T_c (°C)
51	0	00	30	55
		01	35	55
		02	40	55
		03	43	55
		04	30	50
		05	35	50
		06	40	50
		07	43	50
		08	30	49
		09	35	49
		10	40	49
		11	43	49
		12	30	45
		13	35	45
		14	40	45
		15	43	45

(6.2) Y-control

Since there is no external input to change the T_e/T_c value, their values can only be changed by local setup by means of the Daikin remote control (during installation).
Cooling: T_e setting
Heating: T_c setting

Mode n° setting	Setting switch n°	Setting position n°	Setting
23 (13)	1	01	T_e = 5°C
		02	T_e = 6°C
		03	T_e = 7°C
		04	T_e = 8°C
		05	T_e = 9°C
		06	T_e = 10°C
		07	T_e = 11°C
		08	T_e = 12°C
	2	01	T_c = 43°C
		02	T_c = 44°C
		03	T_c = 45°C
		04	T_c = 46°C
		05	T_c = 47°C
		06	T_c = 48°C
		07	T_c = 49°C

(7) Renewal of Target Refrigerant Temperature (X-control)

When a level of the main pcb is updated, the T_e/T_c value of the outdoor is updated simultaneously, otherwise the T_e/T_c value remains constant.
When the DDC level remains constant for A seconds, a level update is executed in the main pcb.

Mode n° setting	Setting switch n°	Setting position n°	Setting
20 (10)	4	**01**	A = 60 sec
		02	A = 120 sec
		03	A = 180 sec
		04	A = 240 sec

3.1.5 Setting of Operation Control Mode from remote control (Local Setting)

The operation control mode is compatible with a variety of controls and operations by limiting the functions of the operation remote control. Furthermore, operations such as remote control ON/OFF can be limited in accordance with the combination conditions.

3.2 Field Setting from Outdoor Unit

3.2.1 Setting by Dip Switches

The following field settings are made by dip switches on PC board.

Dipswitch		Setting item	Description
No.	Setting		
DS1-1	ON	Cool / Heat change over setting	Used to set cool / heat change over setting by remote control equipped with outdoor unit. (Note 1)
	OFF (Factory set)		
DS1-2	ON	Not used	Do not change the factory settings.
	OFF (Factory set)		

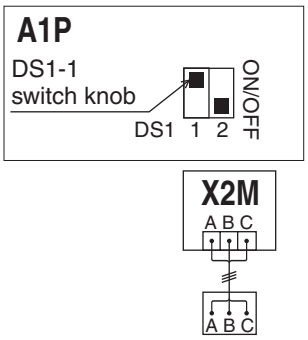
D-box: cool/heat selection by remote control
F-box: no remote control
-> cool/heat selection through ABC-contact

Cool/heat selector connection procedure

- Set the remote control only when changing over the operation mode between cooling and heating using the remote control installed in the outdoor.

① Connect the cool/heat selector (optional accessory) to the terminals (A, B and C) on the outdoor X2M Terminal board (A, B and C).

② Set the cool/heat selector switch DS1-1 from “OFF” (which is selected at the factory before shipment) to “ON”.



Cool/heat selector
(option KRC 19-26 A6)

Caution

Capacity Setting after changing the main PC Board(A1P) to spare parts PC Board

When you change the main PC Board(A1P) to spare parts PC Board, please carry out the following setting.

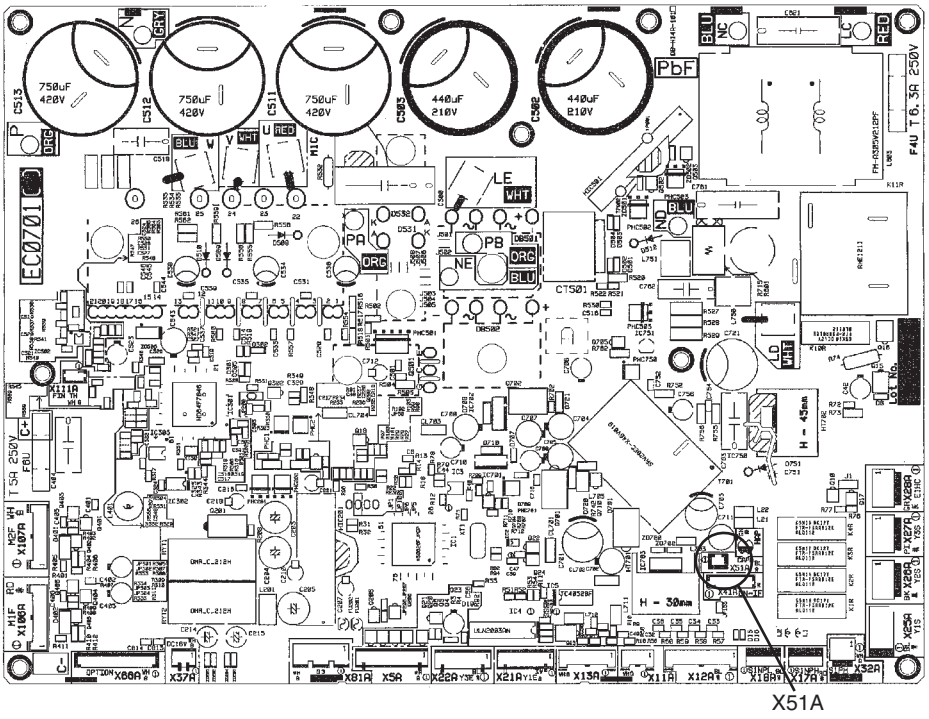
Please Attach the Capacity Setting adapter corresponding to Capacity Class (ex. 112, 140, 160) in connector X51A. (See Below)

Capacity Setting adapter

	Outdoor unit	Capacity Class	Note
①	100	112	CAPACITY SETTING ADAPTOR (for 100/J112)
②	125	140	CAPACITY SETTING ADAPTOR (for 125/J140)
③	140	160	CAPACITY SETTING ADAPTOR (for 140/J160)

Position of Attaching the Capacity Setting Adaptor

ERQ100 / 125 / 140A7V1B

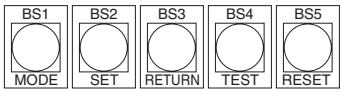


■ **Setting by pushbutton switches**

The following settings are made by pushbutton switches on PC board.

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
LED indication	●	●	○	●	●	●	●

(Factory setting)



(V2760)

There are the following three setting modes.

① **Setting mode 1 (H1P off)**

Initial status (when normal) : Also indicates during “abnormal”.

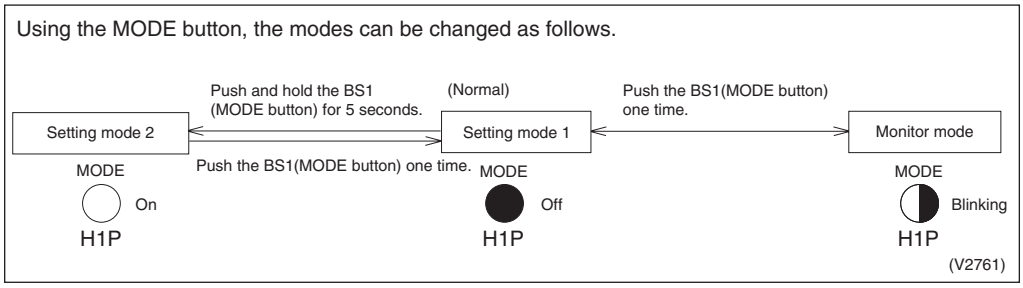
② **Setting mode 2 (H1P on)**

Used to modify the operating status and to set program addresses, etc. Usually used in servicing the system.

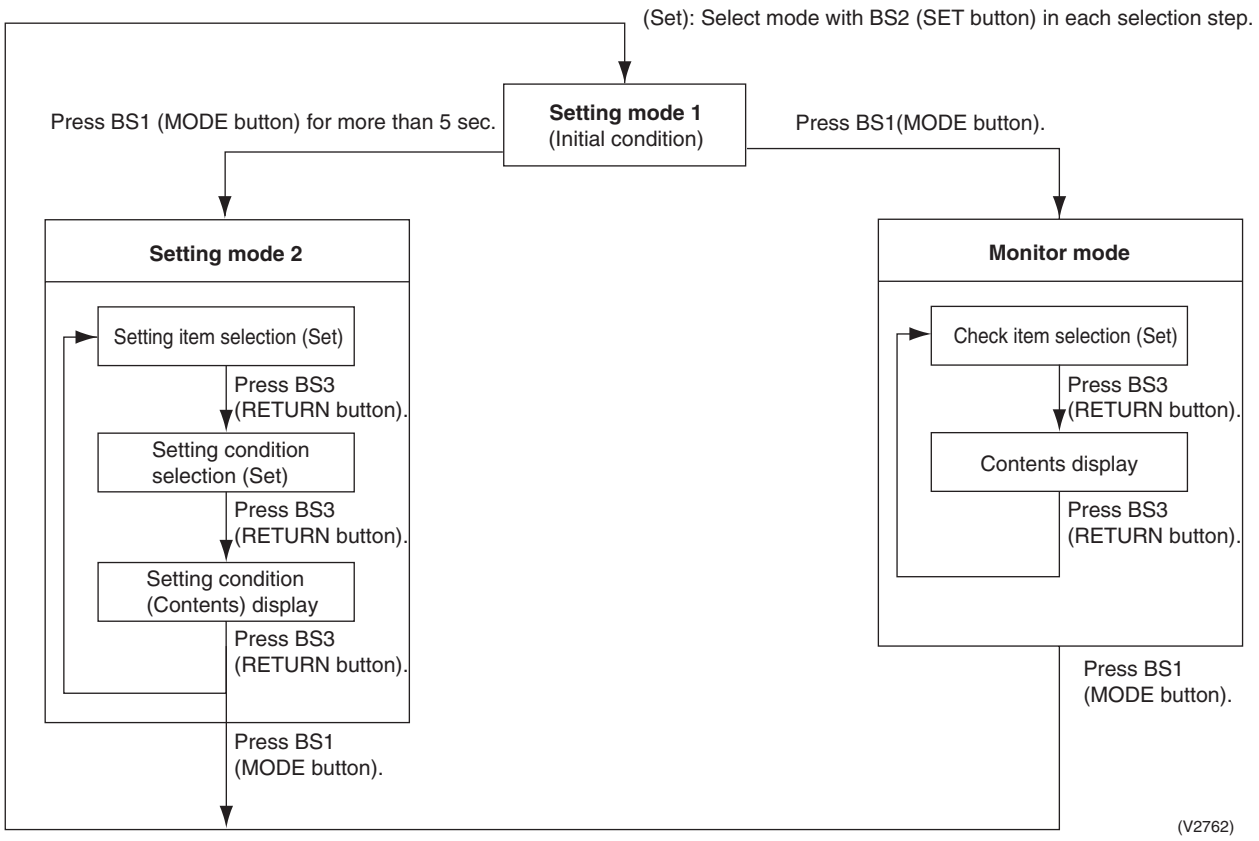
③ **Monitor mode (H1P blinks)**

Used to check the program made in Setting mode 2.

■ Mode changing procedure



■ Mode changing procedure

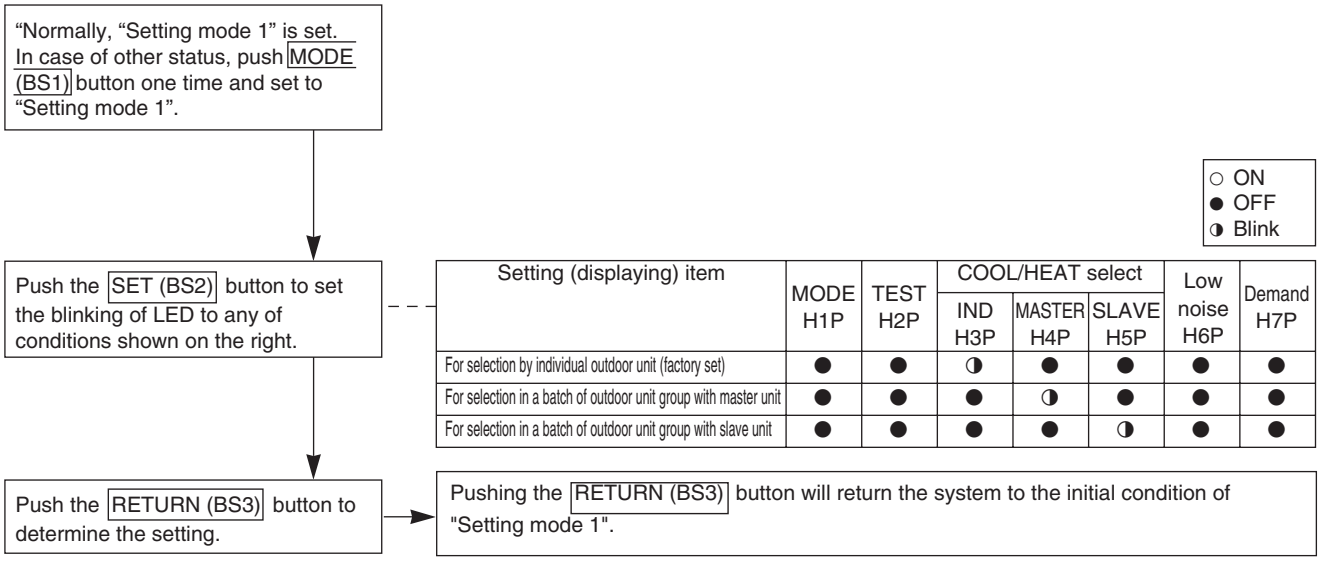

(Set): Select mode with BS2 (SET button) in each selection step.
Press BS1 (MODE button) for more than 5 sec.
Setting mode 1
(Initial condition)
Press BS1(MODE button).
Setting mode 2
Setting item selection (Set)
Press BS3 (RETURN button).
Setting condition selection (Set)
Press BS3 (RETURN button).
Setting condition (Contents) display
Press BS3 (RETURN button).
Press BS1 (MODE button).
Monitor mode
Check item selection (Set)
Press BS3 (RETURN button).
Contents display
Press BS3 (RETURN button).
Press BS1 (MODE button).
(V2762)

a. “Setting mode 1”

This mode is used to set and check the following items.

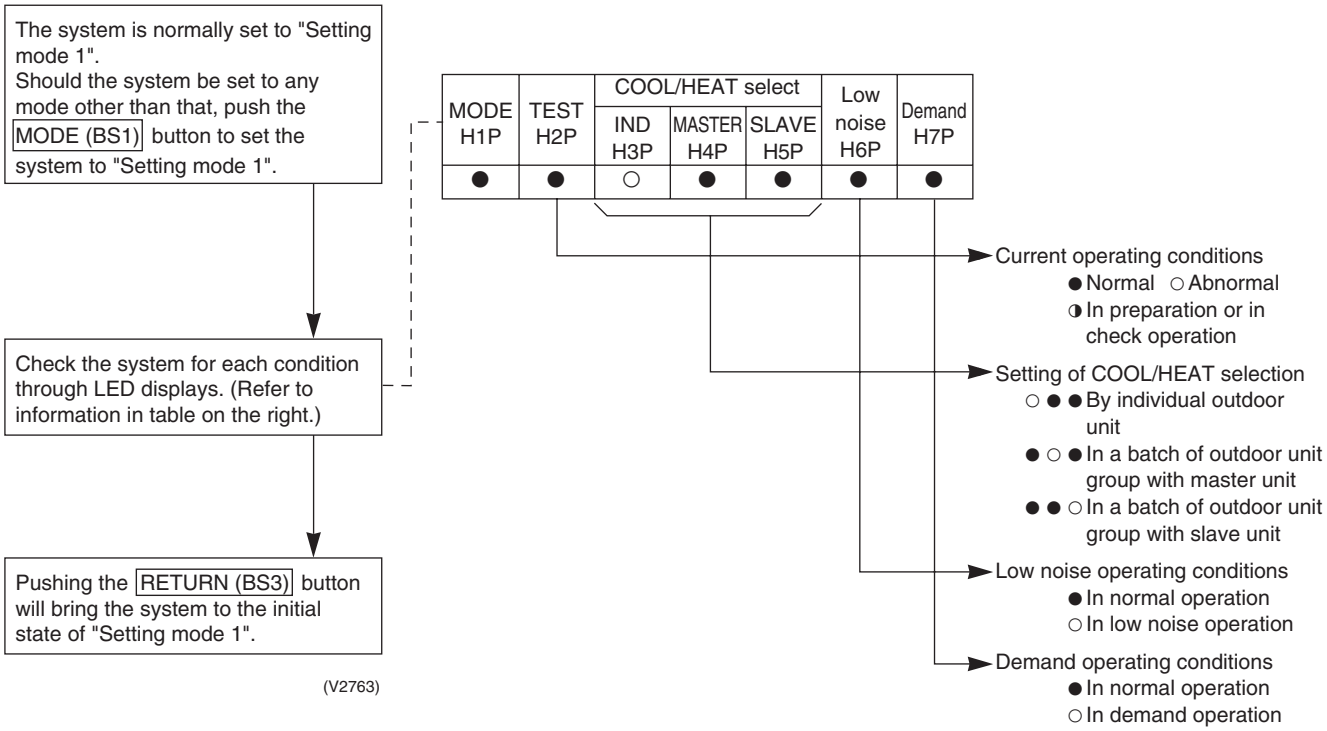
1. Set items ····· In order to make COOL/HEAT selection in a batch of outdoor unit group, change the setting.
   - COOL/HEAT selection (IND) ····· Used to select COOL or HEAT by individual outdoor unit (factory set).
   - COOL/HEAT selection (MASTER) ····· Used to select COOL or HEAT by outdoor unit group with the master unit.
   - COOL/HEAT selection (SLAVE)····· Used to select COOL or HEAT by outdoor unit group with the slave unit.
2. Check items ····· The following items can be checked.
   (1) Current operating conditions (Normal / Abnormal / In check operation)
   (2) Setting conditions of COOL/HEAT selection (Individual / Batch master / Batch slave)
   (3) Low noise operating conditions (In normal operation / In low noise operation)
   (4) Demand operating conditions (In normal operation / In demand operation)

Procedure for changing COOL/HEAT selection setting


“Normally, “Setting mode 1” is set. In case of other status, push MODE (BS1) button one time and set to “Setting mode 1”.
Push the SET (BS2) button to set the blinking of LED to any of conditions shown on the right.
Push the RETURN (BS3) button to determine the setting.
Pushing the RETURN (BS3) button will return the system to the initial condition of "Setting mode 1".
○ ON
● OFF
◑ Blink

Setting (displaying) item	MODE H1P	TEST H2P	COOL/HEAT select IND H3P	COOL/HEAT select MASTER H4P	COOL/HEAT select SLAVE H5P	Low noise H6P	Demand H7P
For selection by individual outdoor unit (factory set)	●	●	◑	●	●	●	●
For selection in a batch of outdoor unit group with master unit	●	●	●	◑	●	●	●
For selection in a batch of outdoor unit group with slave unit	●	●	●	●	◑	●	●

Procedure for checking check items


The system is normally set to "Setting mode 1". Should the system be set to any mode other than that, push the MODE (BS1) button to set the system to "Setting mode 1".
Check the system for each condition through LED displays. (Refer to information in table on the right.)
Pushing the RETURN (BS3) button will bring the system to the initial state of "Setting mode 1".
MODE H1P
TEST H2P
COOL/HEAT select
IND H3P
MASTER H4P
SLAVE H5P
Low noise H6P
Demand H7P
● ● ○ ● ● ● ●
Current operating conditions
● Normal ○ Abnormal
◑ In preparation or in check operation
Setting of COOL/HEAT selection
○ ● ● By individual outdoor unit
● ○ ● In a batch of outdoor unit group with master unit
● ● ○ In a batch of outdoor unit group with slave unit
Low noise operating conditions
● In normal operation
○ In low noise operation
Demand operating conditions
● In normal operation
○ In demand operation

(V2763)

b. “Setting mode 2”

Push and hold the MODE (BS1) button for 5 seconds and set to “Setting mode 2”.

<Selection of setting items>

Push the SET (BS2) button and set the LED display to a setting item shown in the table on the right.
↓
Push the RETURN (BS3) button and decide the item. (The present setting condition is blinked.)

<Selection of setting conditions>

Push the SET (BS2) button and set to the setting condition you want.
↓
Push the RETURN (BS3) button and decide the condition.

Push the RETURN (BS3) button and set to the initial status of “Setting mode 2”.

∗ If you become unsure of how to proceed, push the MODE (BS1) button and return to setting mode 1.

(V2764)

No.	Setting item	Description
1	Cool/heat unified address	Sets address for cool/heat unified operation.
2	Low noise/demand address	Address for low noise/demand operation
3	Test operation settings	Used to conduct test operation without making changes to the PCB and replacing the refrigerant, after the completion of maintenance.
5	AHU forced fan H	Allows forced operation of AHU fan while unit is stopped. (H tap)
6	AHU forced operation	Allows forced operation of AHU.
10	Defrost changeover setting	Changes the temperature condition for defrost and sets to quick defrost or slow defrost.
12	External low noise setting / Demand setting	Reception of external low noise or demand signal
13	AIRNET address	Set address for AIRNET.
20	Additional refrigerant charge operation setting	Carries out additional refrigerant charge operation.
21	Refrigerant recovery / vacuuming mode setting	Sets to refrigerant recovery or vacuuming mode.
22	Night-time low noise setting	Sets automatic nighttime low noise operation in a simple way. The operating time is based on “Starting set” and “Ending set”.
25	Setting of external low noise level	Sets low noise level when the low noise signal is input from outside.
26	Night-time low noise operation start setting	Sets starting time of nighttime low noise operation. (Night-time low noise setting is also required.)
27	Night-time low noise operation end setting	Sets ending time of nighttime low noise operation. (Night-time low noise setting is also required.)
28	Power transistor check mode ∗Check after disconnection of compressor wires	Used for trouble diagnosis of DC compressor. Since the waveform of inverter is output without wiring to the compressor, it is convenient to probe whether the trouble comes from the compressor or PC board.
29	Capacity precedence setting	If the capacity control is required, the low noise control is automatically released by this setting during carrying out low noise operation and nighttime low noise operation.
30	Demand setting 1	Changes target value of power consumption when demand control 1 is input.
32	Normal demand setting	Normally enables demand control 1 without external input. (Effective to prevent a problem that circuit breaker of small capacity is shut down due to large load.)

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

No.	Setting item display								Setting condition display			
	Setting item	MODE H1P	TEST H2P	C/H selection			Low noise H6P	Demand H7P				✻ Factory set
				IND H3P	Master H4P	Slave H5P						
1	Cool / Heat Unified address	☼	●	●	●	●	●	☼	Address Binary number (6 digits)	0 1 ~ 31	☼●●●●●● ☼●●●●●☼ ☼●☼☼☼☼☼	✻
2	Low noise/demand address	☼	●	●	●	●	☼	●	Address Binary number (6 digits)	0 1 ~ 31	☼●●●●●● ☼●●●●●☼ ☼●☼☼☼☼☼	✻
3	Test operation	☼	●	●	●	●	☼	☼	Test operation : OFF Test operation : ON		☼●●●●●☼ ☼●●●●☼●	 ✻
5	Indoor forced fan H	☼	●	●	●	☼	●	☼	Normal operation Indoor forced fan H		☼●●●●●☼ ☼●●●●☼●	✻
6	Indoor forced operation	☼	●	●	●	☼	☼	●	Normal operation Indoor forced operation		☼●●●●●☼ ☼●●●●☼●	✻
10	Defrost changeover setting	☼	●	●	☼	●	☼	●	Quick defrost Normal (factory setting) Slow defrost		☼●●●☼●● ☼●●●●☼● ☼●●●●●☼	 ✻
12	External low noise/ demand setting	☼	●	●	☼	☼	●	●	External low noise/demand: NO External low noise/demand: YES		☼●●●●●☼ ☼●●●●☼●	✻
13	Airnet address	☼	●	●	☼	☼	●	☼	Address Binary number (6 digits)	0 1 63	☼●●●●●● ☼●●●●●☼ ☼☼☼☼☼☼☼	✻
20	Additional refrigerant charging operation setting	☼	●	☼	●	☼	●	●	Refrigerant charging: OFF Refrigerant charging: ON		☼●●●●●☼ ☼●●●●☼●	✻
21	Refrigerant recovery / vacuuming mode setting	☼	●	☼	●	☼	●	☼	Refrigerant recovery / vacuuming: OFF Refrigerant recovery / vacuuming: ON		☼●●●●●☼ ☼●●●●☼●	✻
22	Night-time low noise setting	☼	●	☼	●	☼	☼	●	OFF Level 1 (outdoor fan with 6 step or lower) Level 2 (outdoor fan with 5 step or lower) Level 3 (outdoor fan with 4 step or lower)		☼●●●●●● ☼●●●●●☼ ☼●●●●☼● ☼●●●●☼☼	✻

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

No.	Setting item display								Setting condition display		
	Setting item	MODE H1P	TEST H2P	C/H selection			Low noise H6P	Demand H7P			✻ Factory set
				IND H3P	Master H4P	Slave H5P					
25	Low noise setting	☼	●	☼	☼	●	●	☼	Level 1 (outdoor fan with 6 step or lower) Level 2 (outdoor fan with 5 step or lower) Level 3 (outdoor fan with 4 step or lower)	☼●●●●☼ ☼●●●●☼● ☼●●●☼●●	 ✻
26	Night-time low noise operation start setting	☼	●	☼	☼	●	☼	●	About 20:00 About 22:00 (factory setting) About 24:00	☼●●●●☼ ☼●●●●☼● ☼●●●☼●●	 ✻
27	Night-time low noise operation end setting	☼	●	☼	☼	●	☼	☼	About 6:00 About 7:00 About 8:00 (factory setting)	☼●●●●☼ ☼●●●●☼● ☼●●●☼●●	 ✻
28	Power transistor check mode	☼	●	☼	☼	☼	●	●	OFF ON	☼●●●●☼ ☼●●●●☼●	✻
29	Capacity precedence setting	☼	●	☼	☼	☼	●	☼	OFF ON	☼●●●●☼ ☼●●●●☼●	✻
30	Demand setting 1	☼	●	☼	☼	☼	☼	●	60 % demand 70 % demand 80 % demand	☼●●●●☼ ☼●●●●☼● ☼●●●☼●●	 ✻
32	Normal demand setting	☼	☼	●	●	●	●	●	OFF ON	☼●●●●☼ ☼●●●●☼●	✻

The numbers in the "No." column represent the number of times to press the SET (BS2) button.

c. Monitor mode

To enter the monitor mode, push the MODE (BS1) button when in "Setting mode 1".

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation on setting contents>

Push the RETURN (BS3) button to display different data of set items.

Push the RETURN (BS3) button and switches to the initial status of "Monitor mode".

∗ Push the MODE (BS1) button and returns to "Setting mode 1".

(V2765)

No.	Setting item	LED display							Data display
		H1P	H2P	H3P	H4P	H5P	H6P	H7P	
0	Various setting	◑	●	●	●	●	●	●	See below
1	C/H unified address	◑	●	●	●	●	●	☼	Lower 6 digits
2	Low noise/demand address	◑	●	●	●	●	☼	●	
3	Not used	◑	●	●	●	●	☼	☼	
4	Airnet address	◑	●	●	●	☼	●	●	
5	Number of connected AHUs	◑	●	●	●	☼	●	☼	
7	Number of connected zone units (excluding outdoor and BS unit)	◑	●	●	●	☼	☼	☼	
8	Number of outdoor units	◑	●	●	☼	●	●	●	
11	Number of zone units (excluding outdoor and BS unit)	◑	●	●	☼	●	☼	☼	Lower 6 digits
12	Number of terminal blocks	◑	●	●	☼	☼	●	●	Lower 4 digits: upper
13	Number of terminal blocks	◑	●	●	☼	☼	●	☼	Lower 4 digits: lower
14	Contents of malfunction (the latest)	☼	●	●	☼	☼	☼	●	Malfunction code table
15	Contents of malfunction (1 cycle before)	☼	●	●	☼	☼	☼	☼	Refer to page 161, 162.
16	Contents of malfunction (2 cycle before)	☼	●	☼	●	●	●	●	
20	Contents of retry (the latest)	☼	●	☼	●	☼	●	●	
21	Contents of retry (1 cycle before)	☼	●	☼	●	☼	●	☼	
22	Contents of retry (2 cycle before)	☼	●	☼	●	☼	☼	●	
25	Normal judgment of outdoor units PC board	◑	●	☼	☼	●	●	☼	Lower 2 digits: ☼● Abnormal ●☼ Normal ●● Unjudgment

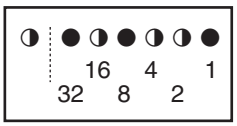
The numbers in the "No." column represent the number of times to press the SET (BS2) button.

Setting item 0 Display contents of "Various setting"

EMG operation / backup operation setting	ON	◑	●	●	☼	●	●	●
	OFF	◑	●	●	●	●	●	●
Defrost select setting	Short	◑	●	●	●	☼	●	●
	Medium	◑	●	●	●	◑	●	●
	Long	◑	●	●	●	●	●	●
Te setting	H	◑	●	●	●	●	☼	●
	M	◑	●	●	●	●	◑	●
	L	◑	●	●	●	●	●	●
Tc setting	H	◑	●	●	●	●	●	☼
	M	◑	●	●	●	●	●	◑
	L	◑	●	●	●	●	●	●

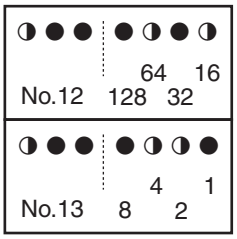
Push the SET button and match with the LEDs No. 1 - 15, push the RETURN button, and confirm the data for each setting.

★ Data such as addresses and number of units is expressed as binary numbers; the two ways of expressing are as follows:



The No. 1 cool/heat unified address is expressed as a binary number consisting of the lower 6 digits. (0 - 63)

In ① the address is 010110 (binary number), which translates to 16 + 4 + 2 = 22 (base 10 number). In other words, the address is 22.



The number of terminal blocks for No. 12 and 13 is expressed as an 8-digit binary number, which is the combination of four upper, and four lower digits for No. 12 and 13 respectively. (0 - 128)
In ② the address for No. 12 is 0101, the address for No. 13 is 0110, and the combination of the two is 01010110 (binary number), which translates to 64 + 16 + 4 + 2 = 86 (base 10 number). In other words, the number of terminal block is 86.

★ See the preceding page for a list of data, etc. for No. 0 - 25.

3.2.2 Cool / Heat Mode Switching

There are the following 2 cool/heat switching modes.

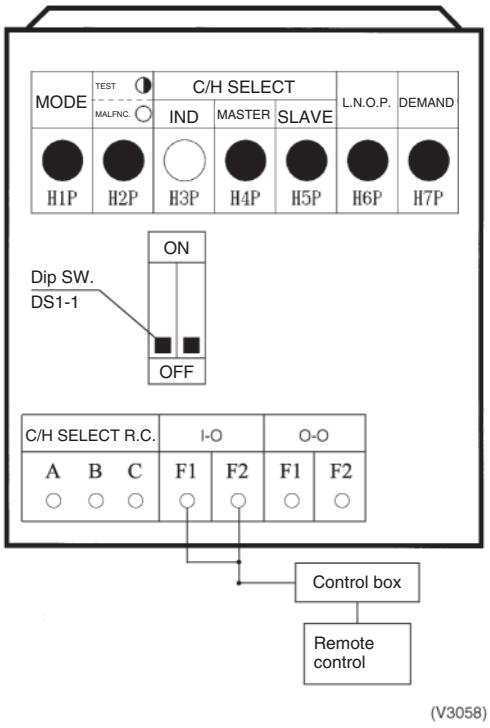
① Set cool/heat separately for each outdoor unit system by AHU remote control (only for Z-control).

② Set cool/heat separately for each outdoor unit system by cool/heat switching remote control (X-, Y- and Z-control).

---

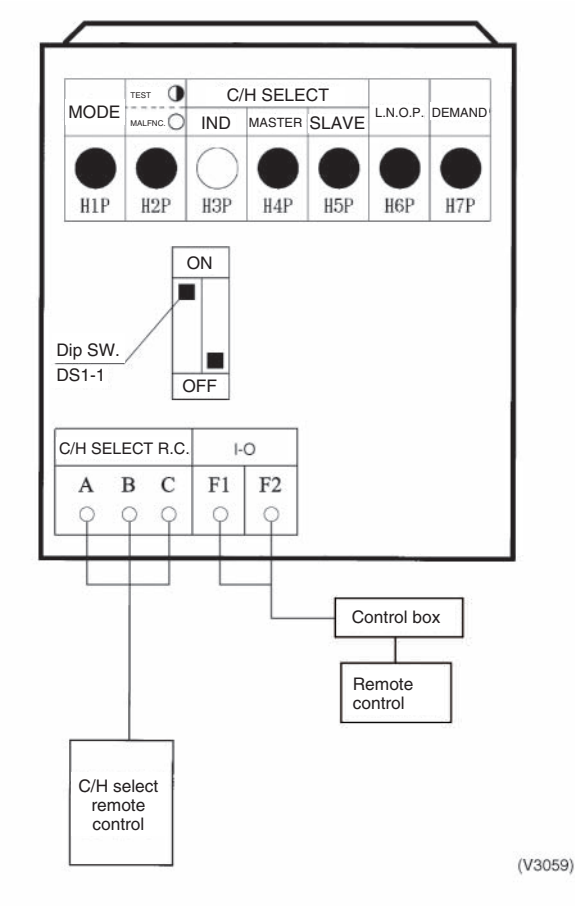
① Set Cool / Heat for Outdoor Unit System by remote control

- ◆ Set outdoor unit PC board DS1-1 to IN (factory set).
- ◆ Set cool/heat switching to IND (individual) for “Setting mode 1” (factory set).



② **Set Cool / Heat Separately for Outdoor Unit System by Cool/Heat Switching remote control**

- ◆ Set outdoor unit PC board DS1-1 to OUT (factory set).
- ◆ Set cool/heat switching to IND (individual) for “Setting mode 1” (factory set).



3.2.3 Setting of Low Noise Operation and Demand Operation

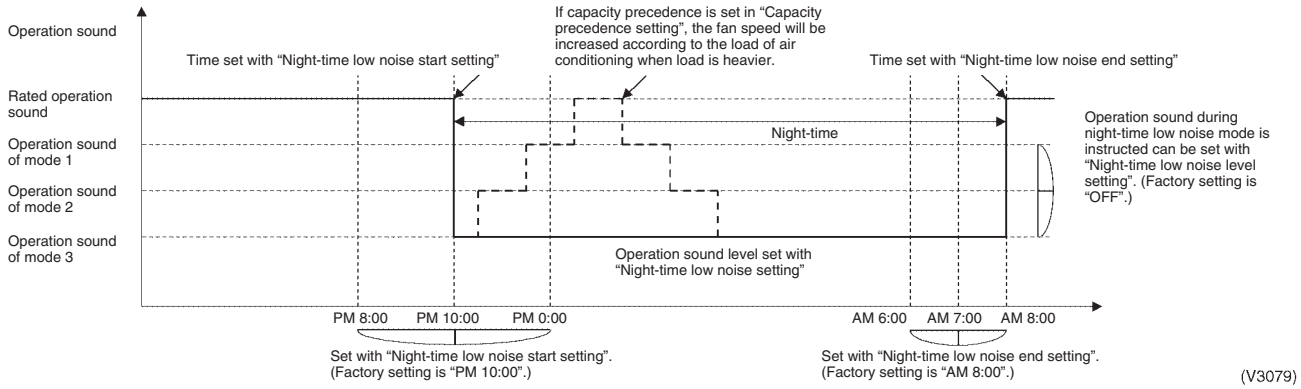
Setting of Low Noise Operation

By connecting the external contact input to the low noise input of the outdoor unit external control adapter (optional DTA104), you can lower operating noise.
Be aware that this setting may cause a slight capacity drop.

When the low noise operation is carried out automatically at night (The external control adapter for outdoor unit is not required)

1. While in "Setting mode 2", select the setting condition (i.e., "Mode 1", "Mode 2", or "Mode 3") for set item No. 22 (Setting of nighttime low noise level).
2. If necessary, while in "Setting mode 2", select the setting condition (i.e., "20:00", "22:00", or "24:00") for set item No. 26 (Setting of start time of nighttime low noise operation).
   (Use the start time as a guide since it is estimated according to outdoor temperatures.)
3. If necessary, while in "Setting mode 2", select the setting condition (i.e., "06:00", "07:00", or "08:00") for set item No. 27 (Setting of end time of nighttime low noise operation).
   (Use the end time as a guide since it is estimated according to outdoor temperatures.)
4. If necessary, while in "Setting mode 2", set the setting condition for set item No. 29 (Setting of capacity precedence) to "ON".
   (If the condition is set to "ON", when the air-conditioning load reaches a high level, the system will be put into normal operation mode even during nighttime.)

Image of operation


Operation sound
Rated operation sound
Operation sound of mode 1
Operation sound of mode 2
Operation sound of mode 3
Time set with “Night-time low noise start setting”
If capacity precedence is set in “Capacity precedence setting”, the fan speed will be increased according to the load of air conditioning when load is heavier.
Time set with “Night-time low noise end setting”
Night-time
Operation sound during night-time low noise mode is instructed can be set with “Night-time low noise level setting”. (Factory setting is “OFF”.)
Operation sound level set with “Night-time low noise setting”
PM 8:00
PM 10:00
PM 0:00
AM 6:00
AM 7:00
AM 8:00
Set with “Night-time low noise start setting”. (Factory setting is “PM 10:00”.)
Set with “Night-time low noise end setting”. (Factory setting is “AM 8:00”.)
(V3079)

Setting of Demand Operation

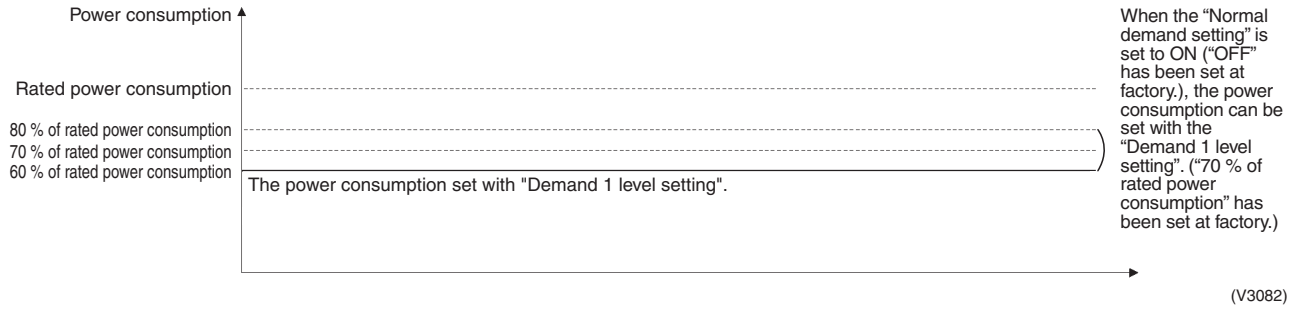
By connecting the external contact input to the demand input of the outdoor unit external control adapter (optional), the power consumption of unit operation can be saved suppressing the compressor operating condition.

Set item	Condition	Content
Demand	Mode 1	The compressor operates at approx. 60% or less of rating.
	Mode 2	The compressor operates at approx. 70% or less of rating.
	Mode 3	The compressor operates at approx. 80% or less of rating.

When the normal demand operation is carried out. (Use of the external control adapter for outdoor unit is not required.)

1. While in "Setting mode 2", make setting of the set item No. 32 (Setting of constant demand) to "ON".
2. While in "Setting mode 2", select the set item No. 30 (Setting of Demand 1 level) and then set the setting condition to targeted mode.

Image of operation


Power consumption
Rated power consumption
80 % of rated power consumption
70 % of rated power consumption
60 % of rated power consumption
The power consumption set with "Demand 1 level setting".
When the “Normal demand setting” is set to ON (“OFF” has been set at factory.), the power consumption can be set with the “Demand 1 level setting”. (“70 % of rated power consumption” has been set at factory.)
(V3082)

Detailed Setting Procedure of Low Noise Operation and Demand Control

1. Setting mode 1 (H1P off)

① In setting mode 2, push the BS1 (MODE button) one time. → Setting mode 1 is entered and H1P off.
During the setting mode 1 is displayed, “In low noise operation” and “In demand control” are displayed.

2. Setting mode 2 (H1P on)

① In setting 1, push and hold the BS1 (MODE button) for more than 5 seconds. → Setting mode 2 is entered and H1P lights.
② Push the BS2 (SET button) several times and match the LED display with the Setting No. you want.
③ Push the BS3 (RETURN button) one time, and the present setting content is displayed.
→ Push the BS2 (SET button) several times and match the LED display with the setting content (as shown on next page) you want.
④ Push the BS3 (RETURN button) two times. → Returns to ①.
⑤ Push the BS1 (MODE button) one time. → Returns to the setting mode 1 and turns H1P off.

☼: ON ●: OFF ◑: Blink

		①							②							③							
Setting No.	Setting contents	Setting No. indication							Setting No. indication							Setting contents	Setting contents indication (Initial setting)						
		H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P		H1P	H2P	H3P	H4P	H5P	H6P	H7P
12	External low noise / Demand setting	☼	●	●	●	●	●	●	☼	●	●	☼	☼	●	●	NO (Factory set)	☼	●	●	●	●	●	◑
																YES	☼	●	●	●	●	◑	●
22	Night-time low noise setting								☼	●	☼	●	☼	☼	●	OFF (Factory setting)	☼	●	●	●	●	●	●
																Mode 1	☼	●	●	●	●	●	◑
																Mode 2	☼	●	●	●	●	◑	●
																Mode 3	☼	●	●	●	●	◑	◑
26	Night-time low noise start setting								☼	●	☼	☼	●	☼	●	PM 8:00	☼	●	●	●	●	●	◑
																PM 10:00 (Factory setting)	☼	●	●	●	●	◑	●
																PM 0:00	☼	●	●	●	◑	●	●
27	Night-time low noise end setting								☼	●	☼	☼	●	☼	☼	AM 6:00	☼	●	●	●	●	●	◑
																AM 7:00	☼	●	●	●	●	◑	●
																AM 8:00 (Factory setting)	☼	●	●	●	◑	●	●
29	Capacity precedence setting								☼	●	☼	☼	☼	●	☼	Low noise precedence (Factory setting)	☼	●	●	●	●	●	◑
																Capacity precedence	☼	●	●	●	●	◑	●
30	Demand setting 1								☼	●	☼	☼	☼	☼	●	60 % of rated power consumption	☼	●	●	●	●	●	◑
																70 % of rated power consumption (Factory setting)	☼	●	●	●	●	◑	●
																80 % of rated power consumption	☼	●	●	●	◑	●	●
32	Normal demand setting								☼	●	●	●	●	●	●	OFF (Factory setting)	☼	●	●	●	●	●	◑
																ON	☼	●	●	●	●	◑	●

Setting mode indication section

Setting No. indication section

Set contents indication section

3.2.4 Setting of Refrigerant Recovery Mode

When carrying out the refrigerant collection on site, fully open the respective expansion valve. All outdoor unit's operation is prohibited.

[Operation procedure]

① In "Setting Mode 2" with units in stop mode, set 21 "Refrigerant Recovery / Vacuuming mode" to ON. The respective expansion valve of the units are fully opened. "TEST OPERATION" is displayed on the remote control, and the outdoor unit operation is prohibited.
After setting, do not cancel "Setting Mode 2" until completion of refrigerant recovery operation.

② Collect the refrigerant using a refrigerant recovery unit. (See the operation manual attached to the refrigerant recovery unit for more detal.)

③ Press Mode button "BS1" once and reset "Setting Mode 2".

3.2.5 Setting of Vacuuming Mode

In order to perform vacuuming operation at site, fully open the expansion valves and turn on some solenoid valves.

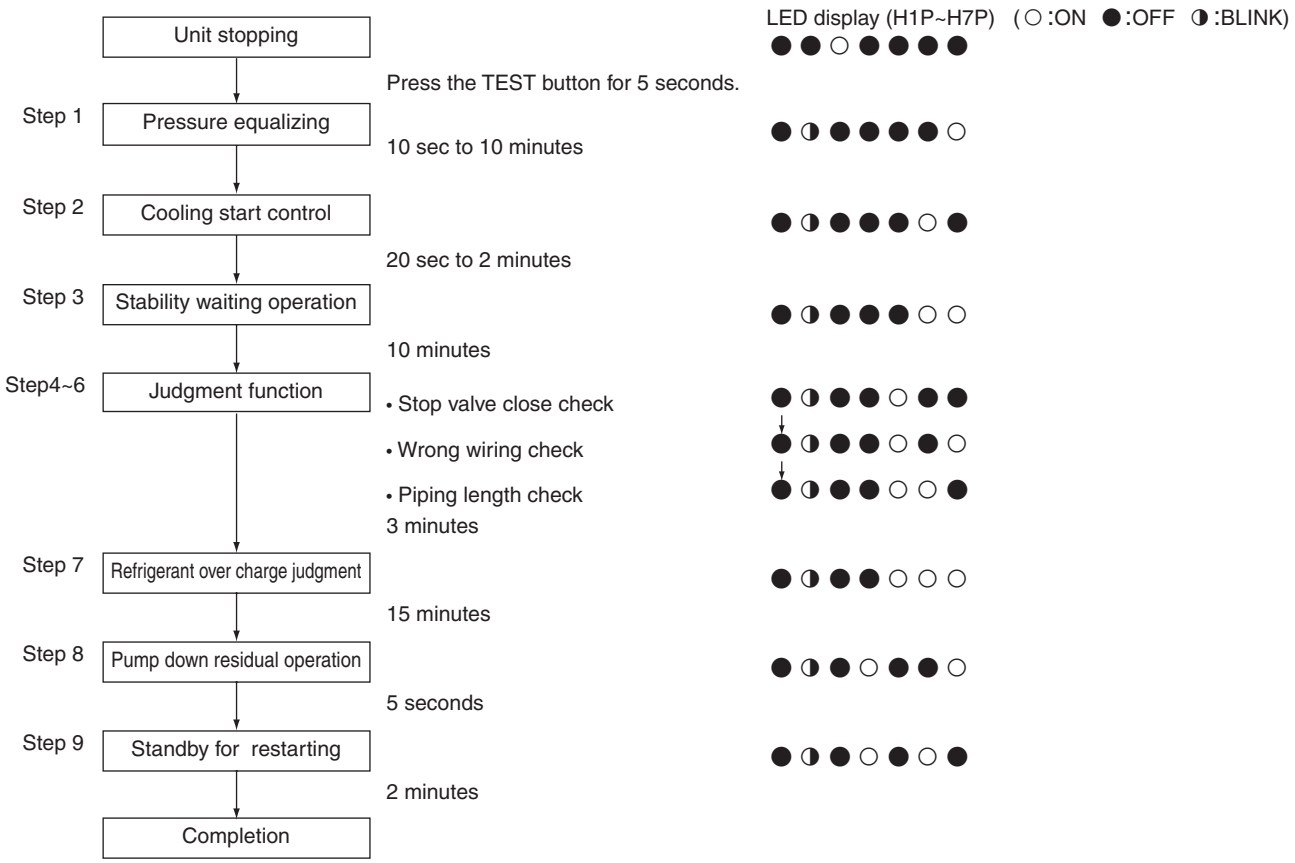
[Operating procedure]

① In "Setting Mode 2" with units in stop mode, set "B Refrigerant Recovery / Vacuuming mode" to ON. The respective expansion valves are fully opened. "TEST OPERATION" is displayed on the remote control, and the outdoor unit operation is prohibited.
After setting, do not cancel "Setting Mode 2" until completion of Vacuuming operation.
② Use the vacuum pump to perform vacuuming operation.
③ Press Mode button "BS1" once and reset "Setting Mode 2".

3.2.6 Check Operation

To prevent any trouble in the period of installation at site, the system is provided with a test operation mode enabling check for incorrect wiring, stop valve left in closed, coming out (or misplacing with suction pipe thermistor) or discharge pipe thermistor and judgment of piping length, refrigerant overcharging, and learning for the minimum opening degree of electronic expansion valve.

CHECK OPERATION FUNCTION



Part 8
Installation and Operation Manual

INSTALLATION MANUAL

Inverter condensing unit

Installation manual
Inverter condensing unit — **English**

Installationsanleitung
Invertierer Verflüssiger — **Deutsch**

Installationsanleitung
Groupe condenseur à inverter — **Français**

Montagehandleiding
Condensorunit met inverter — **Nederlands**

Manual de instalación
Unidad condensadora Inverter — **Español**

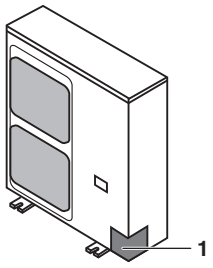
Manuale d'installazione
Unità di condensazione a inverter — **Italiano**

Manual de instalação
Unidade de condensação com inversor — **Portugues**

Инструкция по монтажу
Инверторный конденсаторный агрегат — **русский**

Instrukcja monta¿u
Skraplacz typu Inverter — **polski**

ERQ100A7V1B
ERQ125A7V1B
ERQ140A7V1B



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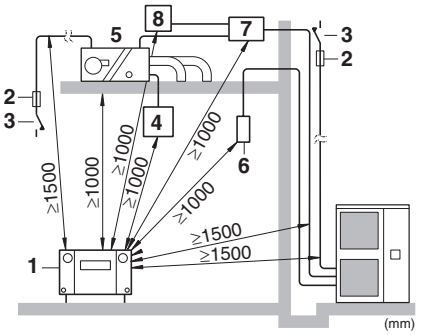

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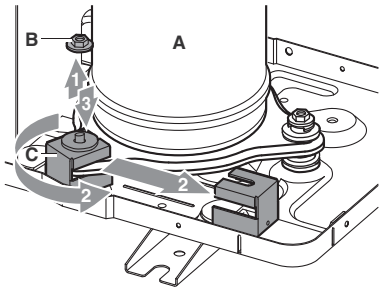

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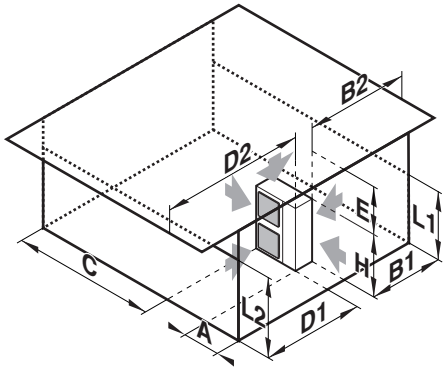
	↑	→	↘	←	↙		A	B1	B2	C	D1	D2	E	L1/L2	
	✓							≥100							
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	✓				✓			≥100				≤500	≥1000		
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		✓									≥500				
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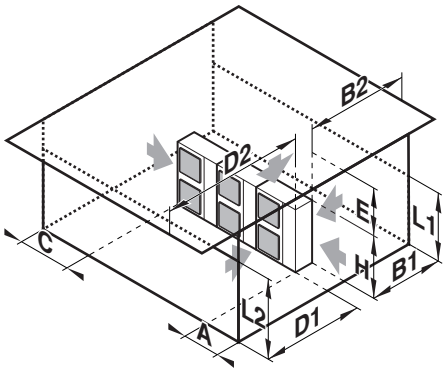
	✓	✓				L2>H		≥100			≥500				3
						L2<H		≥100			≥500				
	✓	✓			✓	L2>H L1≤H		≥250	≤500		≥750		≥1000	0<L1≤½H	1
											≥1000			½H<L1≤H	
						H<L1	L1≤H								
						L2<H L2≤H		≥100			≥1000	≤500	≥1000	0<L2≤½H	3
								≥200						½H<L2≤H	
						H<L2	L2≤H								
	✓		✓	✓			≥200	≥300		≥1000					
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	✓	✓				L2>H		≥300			≥1000				
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								≥300						½H<L2≤H	
	✓	✓			✓	L2>H L1≤H		≥300	≤500		≥1000		≥1000	0<L1≤½H	1+2
											≥1250			½H<L1≤H	
						H<L1	L1≤H								
						L2<H L2≤H		≥250			≥1500	≤500	≥1000	0<L2≤½H	3
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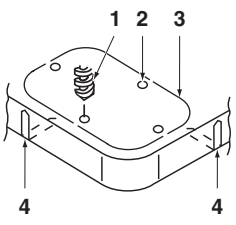
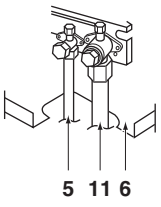
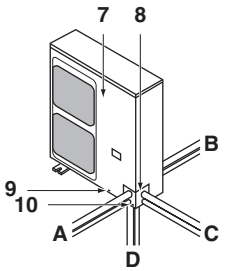
						H<L2	L2≤H								

4







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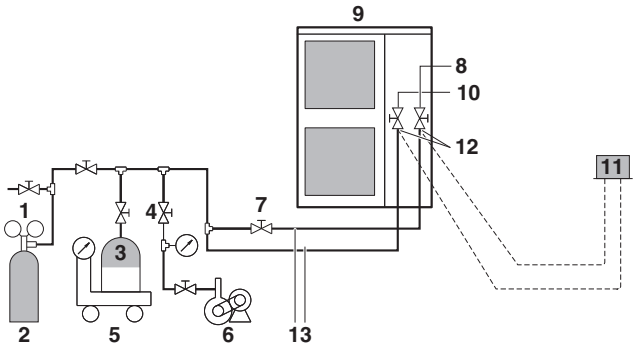

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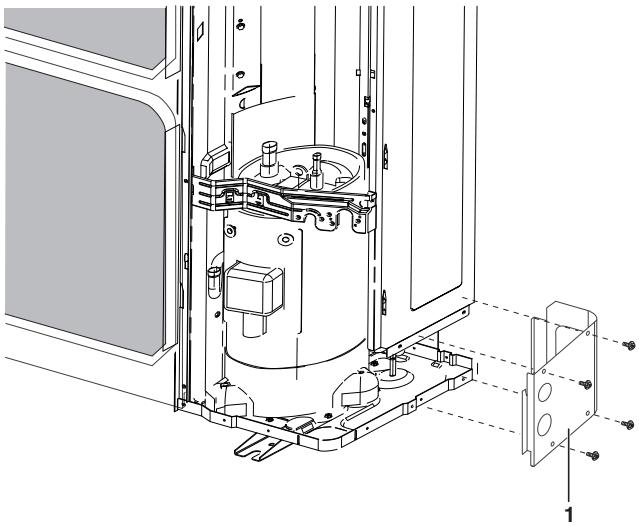

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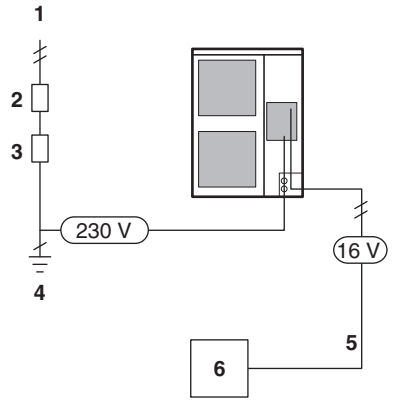

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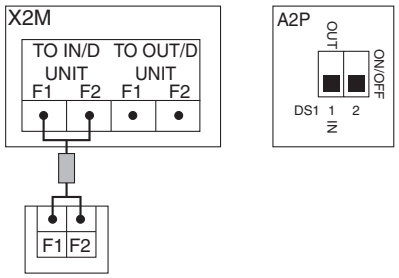

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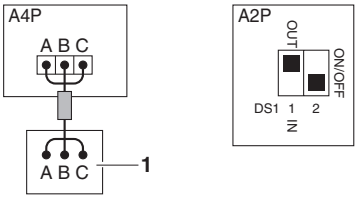

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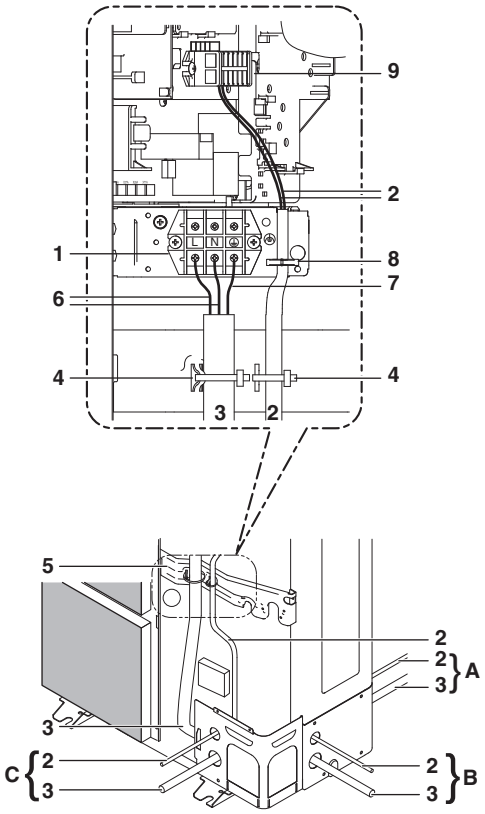

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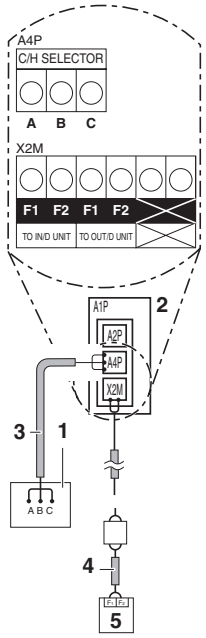

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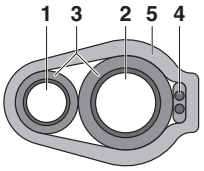

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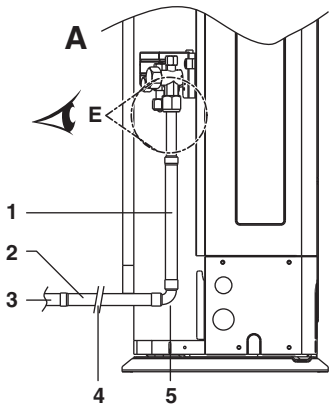

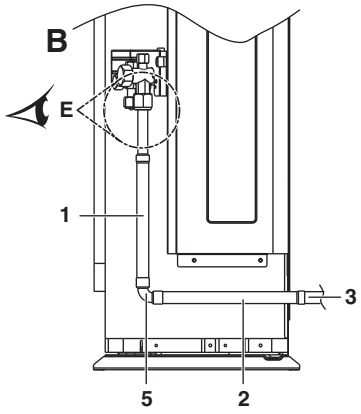

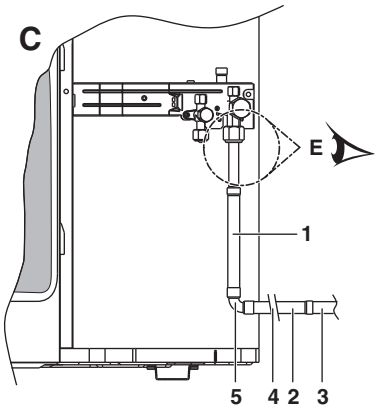

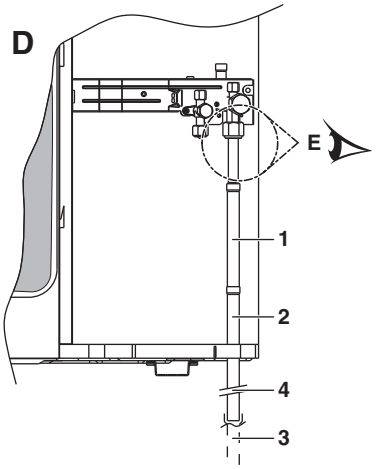

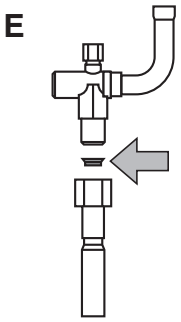

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READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLATION. KEEP THIS MANUAL IN A HANDY PLACE FOR FUTURE REFERENCE.

IMPROPER INSTALLATION OR ATTACHMENT OF EQUIPMENT OR ACCESSORIES COULD RESULT IN ELECTRIC SHOCK, SHORT-CIRCUIT, LEAKS, FIRE OR OTHER DAMAGE TO THE EQUIPMENT. BE SURE ONLY TO USE ACCESSORIES MADE BY DAIKIN WHICH ARE SPECIFICALLY DESIGNED FOR USE WITH THE EQUIPMENT AND HAVE THEM INSTALLED BY A PROFESSIONAL.

DAIKIN EQUIPMENT IS DESIGNED FOR COMFORT APPLICATIONS. FOR USE IN OTHER APPLICATIONS, PLEASE CONTACT YOUR LOCAL DAIKIN DEALER.

IF UNSURE OF INSTALLATION PROCEDURES OR USE, ALWAYS CONTACT YOUR DEALER FOR ADVICE AND INFORMATION.

THIS AIR CONDITIONER COMES UNDER THE TERM "APPLIANCES NOT ACCESSIBLE TO THE GENERAL PUBLIC".

The English text is the original instruction. Other languages are translations of the original instructions.

1. SAFETY CONSIDERATIONS

The precautions listed here are divided into the following two types. Both cover very important topics, so be sure to follow them carefully.

WARNING
If the warning is not observed, it may cause serious casualties.

CAUTION
If the caution is not observed, it may cause injury or damage to the equipment.

Warning

- Ask your dealer or qualified personnel to carry out installation work. Do not install the machine by yourself.
  Improper installation may result in water leakage, electric shocks or fire.
- Perform installation work in accordance with this installation manual.
  Improper installation may lead to water leakage, electric shocks or fire.
- When a unit is installed in a small room, it is necessary to take measures so that the leaked refrigerant amount does not exceed the limit even if it leaks. As for the measures to prevent the leak from not exceeding the limit, please consult with your distributor.
  If the leaked amount exceeds the limit, it may cause an oxygen deficiency accident.
- Be sure to use only the specified accessories and parts for installation work.
  Failure to use the specified parts may result in water leakage, electric shocks, fire, or the unit falling.
- Install the air conditioner on a foundation that can withstand its weight.
  Insufficient strength may result in the fall of equipment and causing injury.
- Carry out the specified installation work in consideration of strong winds, typhoons, or earthquakes.
  Improper installation work may result in accidents due to fall of equipment.

- Make certain that all electrical work is carried out by qualified personnel according to the local laws and regulations and this installation manual, using a separate circuit.
  Insufficient capacity of the power supply circuit or improper electrical construction may lead to electric shocks or fire.
- Make sure that all wiring is secure, using the specified wires and ensuring that external forces do not act on the terminal connections or wires.
  Incomplete connection or fixing may cause a fire.
- When wiring between the air handling units and control box, and wiring the power supply, form the wires so that the frontside panel can be securely fastened.
  If the frontside panel is not in place, overheat of the terminals, electric shocks or a fire may be caused.
- If refrigerant gas leaks during installation work, ventilate the area immediately.
  Toxic gas may be produced if refrigerant gas comes into contact with fire.
- After completing the installation work, check to make sure that there is no leakage of refrigerant gas.
  Toxic gas may be produced if refrigerant gas leaks into the room and comes into contact with a source of fire, such as a fan heater, stove or cooker.
- Before touching electric terminal parts, turn off power switch.

Caution

- Ground the air conditioner.
  Grounding resistance should be according to national regulations
  Do not connect the earth wire to gas or water pipes, lightning conductor or telephone earth wire.
  Incomplete grounding may cause electric shocks.

  - Gas pipe.
    Ignition or explosion may occur if the gas leaks.
  - Water pipe.
    Hard vinyl tubes are not effective grounds.
  - Lightning conductor or telephone ground wire.
    Electric potential may rise abnormally if struck by a lightning bolt.
- Be sure to install an earth leakage breaker.
  Failure to install an earth leakage breaker may cause electric shocks or fire.
- Install drain piping according to this installation manual to ensure good drainage, and insulate the pipe to prevent condensation.
  Improper drain piping may cause water leakage, and make the furniture get wet.
- Install the air handling and outdoor units, power wire and connecting wire at least 1 meter away from televisions or radios to prevent image interference or noise.
  (Depending on the radio waves, a distance of 1 meter may not be sufficient to eliminate the noise.)
- Do not rinse the outdoor unit.
  This may cause electric shocks or fire.
- Do not install the air conditioner in places such as the following:
  - Where there is mist of mineral oil, oil spray or vapour for example a kitchen.
    Plastic parts may deteriorate, and cause them to fall out or water to leak.
  - Where corrosive gas, such as sulfurous acid gas, is produced.
    Corrosion of copper pipes or soldered parts may cause the refrigerant to leak.
  - Where there is machinery which emits electromagnetic waves.
    Electromagnetic waves may disturb the control system, and cause malfunction of the equipment.
  - Where flammable gases may leak, where carbon fiber or ignitable dust is suspended in the air or where volatile flammables, such as thinner or gasoline, are handled.
    Such gases may cause a fire.
  - Where the air contains high levels of salt such as that near the ocean.
  - Where voltage fluctuates a lot, such as that in factories.
  - In vehicles or vessels.
  - Where acidic or alkaline vapour is present.
- Do not touch any refrigerant which has leaked out of refrigerant piping connections.
  This may result in frostbite.
- Do NOT connect the system to DIII-net devices:
  - intelligent touch Controller
  - intelligent Manager
  - DMS-IF
  - BACnet Gateway
  - ...

  This could result in malfunction or breakdown of the total system.

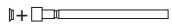
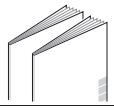
2. INTRODUCTION

2.1. Combination

The air handling units can be installed in the following range.

- Always use appropriate air handling units compatible with R410A.
  To learn which models of air handling units are compatible with R410A, refer to the product catalogs.
- The manufacturer of this outdoor unit has limited responsibility for total capacity of the system because performance is determined by the total system. The discharge air may fluctuate depending on selected air handling unit and depending on the installation configuration.
- Both air handling unit and digital controller software and hardware are field supply and are to be selected by the installer. Refer to the manual "Option kit for combination of Daikin condensing units with field supplied evaporators" for more details.
  Recommended temperature setting on the field supplied controller is between 16°C and 25°C.

2.2. Standard supplied accessories

Gas line piping (1)(*) + copper gasket	1	
Gas line piping (2)(*)	1	
Gas line piping (3)(*)	1	
Installation manual Operation manual	1 1	
Fluorinated greenhouse gases label	1	
Multilingual fluorinated greenhouse gases label	1	

(*) Only for ERQ140.

Location of accessories: refer to figure 1.

1 Accessories

2.3. Technical and electrical specifications

Refer to the Engineering Data Book for the complete list of specifications.

3. BEFORE INSTALLATION

Since design pressure is 4.0 MPa or 40 bar, pipes of larger wall thickness may be required. Refer to paragraph "7.1. Selection of piping material" on page 126.

3.1. Precautions for R410A

- The refrigerant requires strict cautions for keeping the system clean, dry and tight.
  - Clean and dry

  Foreign materials (including mineral oils or moisture) should be prevented from getting mixed into the system.
  - Tight

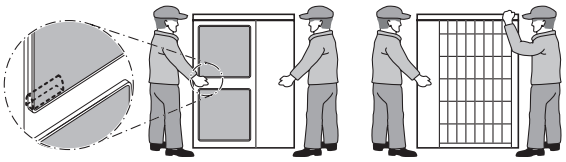
  Read "8. Precautions on refrigerant piping" on page 126 carefully and follow these procedures correctly.
- Since R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. (If the refrigerant is in state of gas, its composition changes and the system will not work properly).
- The connected air handling units must be air handling units designed exclusively for R410A.

3.2. Installation

- For installation of the air handling unit(s), refer to the air handling unit installation manual.
- Never operate the air conditioner with the discharge pipe thermistor (R2T), suction pipe thermistor (R3T) and pressure sensors (S1NPH, S1NPL) removed. Such operation may burn out the compressor.
- Be sure to confirm the model name and the serial no. of the outer (front) plates when attaching/detaching the plates to avoid mistakes.
- When closing the service panels, take care that the tightening torque does not exceed 4.1 N•m.

3.3. Handling

As shown in the figure, bring the unit slowly by grabbing the left and right grips.



Place your hands on the corner instead of holding the suction inlet in the side of the casing, otherwise the casing could be deformed.

Take care not to let hands or objects come in contact with rear fins.

4. SELECTING INSTALLATION SITE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

- Make sure to provide for adequate measures in order to prevent that the outdoor unit be used as a shelter by small animals.
- Small animals making contact with electrical parts can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean.

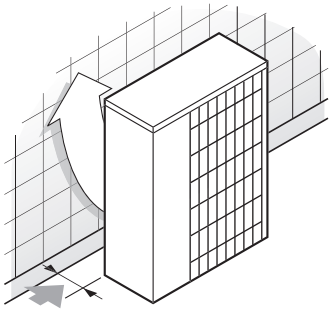
1 Select an installation site where the following conditions are satisfied and that meets with your customer's approval.
- Places which are well-ventilated.
- Places where the unit does not bother next-door neighbours.
- Safe places which can withstand the unit's weight and vibration and where the unit can be installed level.
- Places where there is no possibility of flammable gas or product leak.
- Places where servicing space can be well ensured.
- Places where the air handling and outdoor units' piping and wiring lengths come within the allowable ranges.
- Places where water leaking from the unit cannot cause damage to the location (e.g. in case of a blocked drain pipe).
- Places where the rain can be avoided as much as possible.

2 When installing the unit in a place exposed to strong wind, pay special attention to the following.

Strong winds of 5 m/sec or more blowing against the outdoor unit's air outlet causes short circuit (suction of discharge air), and this may have the following consequences:
- Deterioration of the operational capacity.
- Frequent frost acceleration in heating operation.
- Disruption of operation due to rise of high pressure.
- When a strong wind blows continuously on the face of the unit, the fan can start rotating very fast until it breaks.

Refer to the figures for installation of this unit in a place where the wind direction can be foreseen.

■ Turn the air outlet side toward the building's wall, fence or screen.

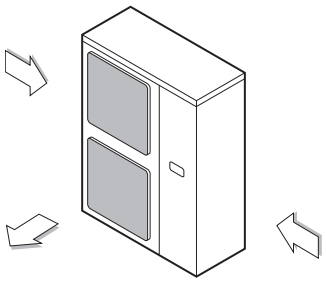


➪ Make sure there is enough room to do the installation

■ Set the outlet side at a right angle to the direction of the wind.

Strong wind

Blown air



Strong wind

3 Prepare a water drainage channel around the foundation, to drain waste water from around the unit.

4 If the water drainage of the unit is not easy, please build up the unit on a foundation of concrete blocks, etc. (the height of the foundation should be maximum 150 mm).

5 If you install the unit on a frame, please install a waterproof plate within 150 mm of the underside of the unit in order to prevent the invasion of water from the lower direction.

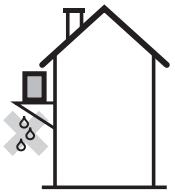
6 When installing the unit in a place frequently exposed to snow, pay special attention to the following:

- Elevate the foundation as high as possible.
- Construct a large canopy (field supply).
- Remove the rear suction grille to prevent snow from accumulating on the rear fins.

7 The outdoor unit may short circuit depending on its environment, so use the louvers (field supply).

8 Do not install or operate the unit on locations where air contains high levels of salt, like e.g. in the vicinity of oceans. (Refer for further information to the engineering databook).

9 If you install the unit on a building frame, please install a waterproof plate (within 150 mm of the underside of the unit) or use a drain plug kit (option) in order to avoid the drain water dripping.



10 The equipment is not intended for use in a potentially explosive atmosphere.

The equipment described in this manual may cause electronic noise generated from radio-frequency energy. The equipment complies to specifications that are designed to provide reasonable protection against such interference. However, there is no guarantee that interference will not occur in a particular installation.

It is therefore recommended to install the equipment and electric wires keeping proper distances away from stereo equipment, personal computers, etc... (See figure 2)

1	Personal computer or radio
2	Fuse
3	Earth leakage breaker
4	remote control
5	Cool/heat selector
6	Air handling unit
7	Control box
8	Expansion valve kit

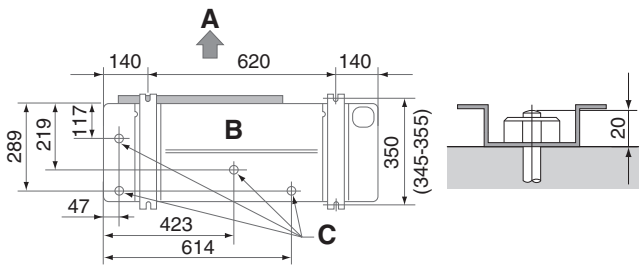
In places with weak reception, keep distances of 3 m or more to avoid electromagnetic disturbance of other equipment and use conduit tubes for power and transmission lines.

5. PRECAUTIONS ON INSTALLATION

■ Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise after installation.

■ In accordance with the foundation drawing in the figure, fix the unit securely by means of the foundation bolts. (Prepare four sets of M12 foundation bolts, nuts and washers each which are available on the market.)

■ It is best to screw in the foundation bolts until their length are 20 mm from the foundation surface.



A Discharge side

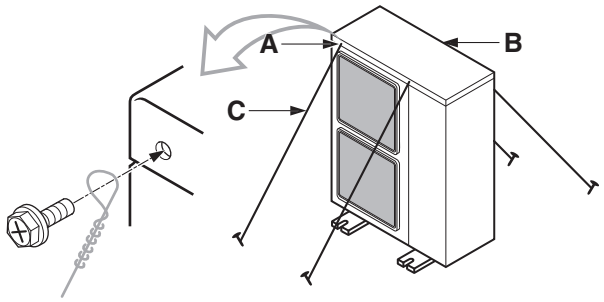
B Bottom view (mm)

C Drain hole

5.1. Installation method for prevention of falling over

If it is necessary to prevent the unit from falling over, install as shown in the figure.

- prepare all 4 wires as indicated in the drawing
- unscrew the top plate at the 4 locations indicated A and B
- put the screws through the nooses and screw them back tight



A location of the 2 fixation holes on the front side of the unit

B location of the 2 fixation holes on the rear side of the unit

C wires: field supply

5.2. Method for removing transportation stay

The yellow transportation stay installed over the compressor leg for protecting the unit during transport must be removed. Proceed as shown in figure 3 and described below.

A Compressor

B Fixing nut

C Transportation stay

1 Slightly loosen the fixing nut (B).

2 Remove the transportation stay (C) as shown in figure 3.

3 Tighten the fixing nut (B) again.

CAUTION

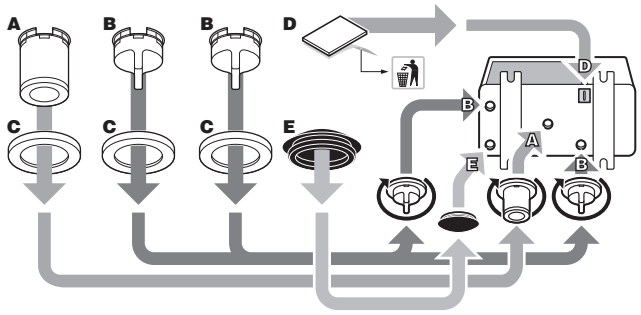
If the unit is operated with the transportation stay attached, abnormal vibration or noise may be generated.

5.3. Method for installing drain piping

Depending on installation site, it may be required to install drain plug for drainage (option kit).

In cold areas, do not use a drain hose with the outdoor unit. Otherwise, drain water may freeze, impairing the heating performance.

1 See figure below for installation of the drain plug.



A Drain socket

B Drain cap

C Drain receiver

D Insulation tape

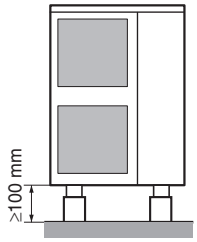
E Drain stop

2 Connect a field supplied vinyl hose (internal diameter of 25 mm) to the drain socket (A).

If the hose is too long and hangs down, fix it carefully to prevent kinks.

NOTE

If drain holes of the outdoor unit are covered by a mounting base or by floor surface, raise the unit in order to provide a free space of more than 100 mm under the outdoor unit.



6. Installation servicing space

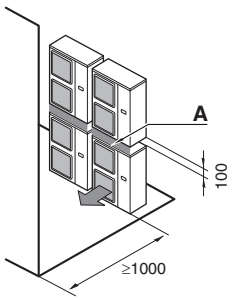
- The connection piping outlet direction in the installation shown in figure 4 is frontward or downward. The unit of numeric values is mm.
- When routing the piping backward, secure space of ≥ 250 mm on the right side of the unit.

(A) In case of non-stacked installation (See figure 4)

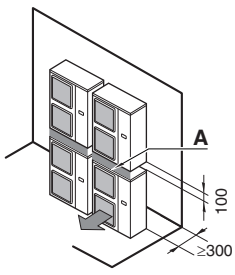
	Suction side obstacle	**1**	In these cases, close the bottom of the installation frame to prevent the discharged air from being bypassed
	Discharge side obstacle		
	Left side obstacle	**2**	In these cases, only 2 units can be installed.
	Right side obstacle	**3**	In these cases, no restriction of height L1.
	Top side obstacle		This situation is not allowed
✓	Obstacle is present		

(B) In case of stacked installation

1. In case obstacles exist in front of the outlet side.



2. In case obstacles exist in front of the air inlet.

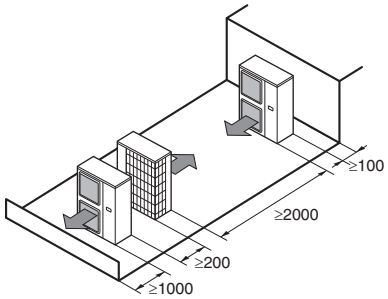


NOTE

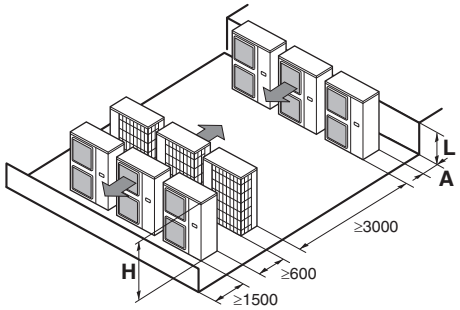
- Do not stack more than one unit.
- About 100 mm is required as the dimension for laying the upper outdoor unit's drain pipe.
- Get the portion A sealed so that air from the outlet does not bypass.

(C) In case of multiple-row installation (for roof top use, etc.)

1. In case of installing one unit per row.



2. In case of installing multiple units (2 units or more) in lateral connection per row.



Relation of dimensions between H, A and L is shown in the table below.

	L	A (mm)
L≤ H	0<L≤ 1/2H	250
	1/2H<L≤ H	300
H<L	Installation impossible	

7. Refrigerant pipe size and allowable pipe length

All field piping must be installed by a licensed refrigeration technician and must comply with relevant local and national regulations.

To persons in charge of piping work:

- Be sure to open the stop valve after piping installing and vacuuming is complete. (Running the system with the valve closed may break the compressor.)
- It is forbidden to discharge refrigerant into the atmosphere. Collect the refrigerant in accordance with the freon collection and destruction law.
- Do not use flux when brazing the refrigerant piping.
  For brazing, use phosphor copper brazing filler metal (BCuP) which does not require a flux.
  (If a chlorine flux is used, the piping will corrode, and if the flux contains fluoride, it will cause the coolant oil to deteriorate, adversely affecting the coolant piping system.
- Do not use materials not compatible with copper. Example: Aluminium heat exchanger may be cause of corrosion.

7.1. Selection of piping material

- Foreign materials inside pipes (including oils for fabrication) must be ≤ 30 mg/10 m.
- Construction material: phosphoric acid deoxidized seamless copper for refrigerant.
- Temper grade: use piping with temper grade in function of the pipe diameter as listed in table below.
- The pipe thickness of the refrigerant piping should comply with relevant local and national regulations. The minimal pipe thickness for R410A piping must be in accordance with the table below.

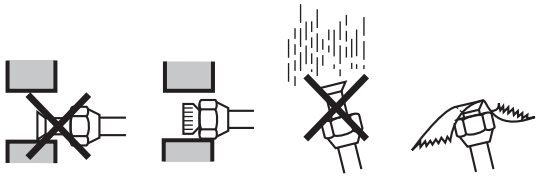
Pipe Ø	Temper grade of piping material	Minimal thickness t (mm)
6.4 / 12.7	O	0.80
15.9	O	1
19.1	1/2H	1

O = Annealed
1/2H = Half hard

- In case the required pipe sizes (inch sizes) are not available, it is also allowed to use other diameters (mm sizes), taken the following into account:
  - select the pipe size nearest to the required size.
  - use the suitable adapters for the change-over from inch to mm pipes (field supply).

8. Precautions on refrigerant piping

- Do not allow anything other than the designated refrigerant to get mixed into the freezing cycle, such as air, etc. If any refrigerant gas leaks while working on the unit, ventilate the room thoroughly right away.
- Use R410A only when adding refrigerant
  Installation tools:
  Make sure to use installation tools (gauge manifold charge hose, etc.) that are exclusively used for R410A installations to withstand the pressure and to prevent foreign materials (e.g. mineral oils and moisture) from mixing into the system.
  Vacuum pump:
  Use a 2-stage vacuum pump with a non-return valve
  Make sure the pump oil does not flow oppositely into the system while the pump is not working.
  Use a vacuum pump which can evacuate to –100.7 kPa (5 Torr, –755 mm Hg).
- In order to prevent dirt, liquid or dust from entering the piping, cure the piping with a pinch or taping.



	Installation period	Protection method
	More than a month	Pinch the pipe
	Less than a month	Pinch or tape the pipe
	Regardless of the period	

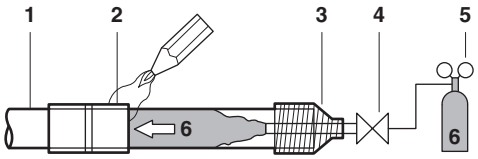
Great caution is needed when passing copper tubes through walls.

- For handling of stop valves, refer to "9.3. How to use the stop valve" on page 128.
- Only use the flare nuts included with the unit. Using different flare nuts may cause the refrigerant to leak.

- Always use the supplied copper gasket when connecting the gas pipe supplied with the unit. See "9. Refrigerant piping" on page 127.

8.1. Cautions for brazing

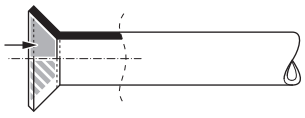
- Be sure to carry out a nitrogen blow when brazing.
  Brazing without carrying out nitrogen replacement or releasing nitrogen into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.
- When brazing while inserting nitrogen into the piping, nitrogen must be set to 0.02 MPa with a pressure-reducing valve (=just enough so that it can be felt on the skin).



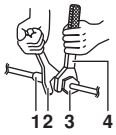
1 Refrigerant piping
2 Part to be brazed
3 Taping
4 Hands valve
5 Pressure-reducing valve
6 Nitrogen

8.2. Cautions for flare connection

- See the following table for flare part machining dimensions.
- When connecting the flare nut, coat the flare inner surface with ether oil or ester oil and initially tighten 3 or 4 turns by hand before tightening firmly.

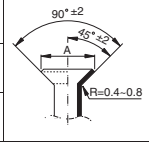


- When loosening a flare nut, always use two wrenches in combination. When connecting the piping, always use a spanner and torque wrench in combination to tighten the flare nut.



1 Piping union
2 Spanner
3 Flare nut
4 Torque wrench

- See the following table for tightening torque.
  (Applying too much torque may cause the flares to crack.)

Pipe size	Tightening torque (N•m)	A (mm)	Flare shape
Ø9.5	33~39 N•m	12.8~13.2	
Ø15.9	63~75 N•m	19.3~19.7	
Ø19.1	98~110 N•m	12.3~23.7	

- After all the piping has been connected, use nitrogen to perform a gas leak check.

NOTE

You must use a torque wrench but if you are obliged to install the unit without a torque wrench, you may follow the installation method mentioned below.

After the work is finished, make sure to check that there is no gas leak.

When you keep on tightening the flare nut with a spanner, there is a point where the tightening torque suddenly increases. From that position, further tighten the flare nut within the angle shown below:

Pipe size	Further tightening angle	Recommended arm length of tool
Ø9.5 (3/8")	60~90°	±200 mm
Ø15.9 (5/8")	30~60°	±300 mm
Ø19.1 (5/8")	20~35°	±450 mm

9. Refrigerant piping

- Field pipes can be installed in four directions.

Figure - Field pipes in four directions (See figure 5)

1 Drill
2 Center area around knockout hole
3 Knockout hole
4 Slit
5 Connecting pipe liquid (field supply)
6 Bottom frame
7 Front plate
8 Pipe outlet plate
9 Screw front plate
10 Pipe outlet plate screw
11 Connecting pipe gas (field supply, except ERQ250)
A Forward
B Backward
C Sideways
D Downward

When connecting the piping in the lateral direction (on the rear), remove the piping cover (rear) in reference to figure 7.

1 Piping cover (rear)

- To install the connecting pipe to the unit in a downward direction, make a knockout hole by penetrating the center area around the knockout hole using a Ø6 mm drill. (See figure 5).
- Cutting out the two slits makes it possible to install as shown in figure 5.
  (Use a metal saw to cut out the slits.)
- After knocking out the knock-out, it is recommended to apply repair paint to the edge and the surrounding end surfaces to prevent rusting.

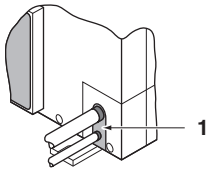
For ERQ140 only

The size of the gas side stop valve is Ø15.9 while the inter-unit piping is Ø19.1. Use the standard supplied accessory piping to make the connection. See figure 14.

A Front connection
B Rear connection
C Side connection
D Bottom connection
1 Gas line piping + copper gasket supplied with the unit (make sure to always use the copper gasket).
2 Gas line piping supplied with the unit
3 Gas piping (field supply)
4 Cut to the appropriate length.
5 Gas line piping supplied with the unit

9.1. Preventing foreign objects from entering

Plug the pipe through-holes with putty or insulating material (field supply) to stop up all gaps, as shown in the figure.



1 Putty or insulating material (field supply)

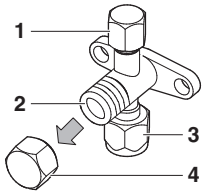
Insects or small animals entering the outdoor unit may cause a short circuit in the electrical box.

9.2. Cautions for handling stop valve

- The stop valves for air handling unit-outdoor connecting piping are closed at shipment from the factory.

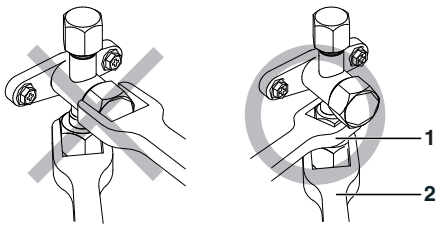
  Make sure to keep the valve open during operation.

  The names of parts of the stop valve are shown in the figure.



1 Service port
2 Stop valve
3 Field piping connection
4 Valve cover

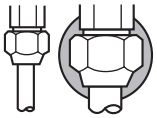
- Since the side boards may be deformed if only a torque wrench is used when loosening or tightening flare nuts, always lock the stop valve with a wrench and then use a torque wrench.
  Do not place wrenches on the valve cover.



1 Spanner
2 Torque wrench

Do not apply force on the valve cover, this may result in a refrigerant leak.

- For cooling operation under low ambient temperature or any other operation under low pressure, apply silicon pad or similar to prevent freezing of the gas stop valve flare nut (see figure). Freezing of the flare nut may cause refrigerant leak.

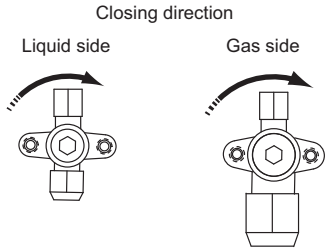


Silicon sealing pad
(Make sure there is no gap)

9.3. How to use the stop valve

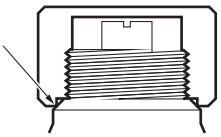
Use hexagonal wrenches 4 mm and 6 mm.

- Opening the valve
  1. Place the hex wrench on the valve bar and turn counter-clockwise.
  2. Stop when the valve bar no longer turns. It is now open.
- Closing the valve
  1. Place the hex wrench on the valve bar and turn clockwise.
  2. Stop when the valve bar no longer turns. It is now closed.



9.4. Cautions for handling the valve cover

- The valve cover is sealed where indicated by the arrow.
  Take care not to damage it.



- After operating the valve, be sure to tighten the valve cover properly.

	Tightening torque
Liquid pipe	13.5~16.5 N•m
Gas pipe	22.5~27.5 N•m

- Check for refrigerant leakage after tightening the cap.

9.5. Cautions for handling service port

After the work, tighten the valve cover in place.

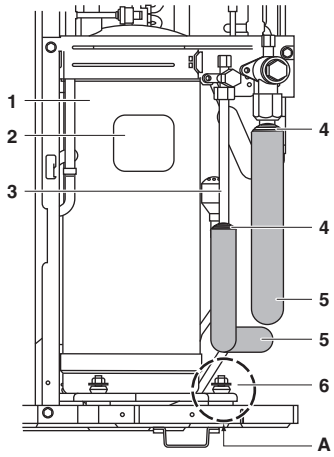
Tightening torque: 11.5~13.9 N•m

9.6. Precautions when connecting field piping and regarding insulation

- Be careful not to let the air handling and outdoor branch piping come into contact with the compressor terminal cover.
  If the liquid-side piping insulation might come into contact with it, adjust the height as shown in the figure below. Also, make sure the field piping does not touch the bolts or outer panels of the compressor.
- When the outdoor unit is installed above the air handling unit the following can occur:
  The condensated water on the stop valve can move to the air handling unit. To avoid this, please cover the stop valve with sealing material.
- If the temperature is higher than 30°C and the humidity is higher than RH 80%, then the thickness of the sealing materials should be at least 20 mm in order to avoid condensation on the surface of the sealing.
- Be sure to insulate the liquid and gas-side field piping and the refrigerant branch kit.

  Any exposed piping may cause condensation or burns if touched.

  (The highest temperature that the gas-side piping can reach is around 120°C, so be sure to use insulating material which is very resistant.)



1	Compressor
2	Terminal cover
3	Indoor and outdoor field piping
4	Corking, etc.
5	Insulation material (field supply)
6	Bolts
A	Be careful with pipe, bolt and outer panel connections

9.7. Leak test and vacuum drying

The units were checked for leaks by the manufacturer.

See figure 6 and refer to "Additional refrigerant charge" on page 129 for nomenclature of the parts in figure 6.

- Confirm that the gas and liquid line stop valves are firmly closed before pressure test or vacuuming.
- Make sure that valve A is completely open.

Air tight test and vacuum drying

- Air tight test: Make sure to use nitrogen gas. (For the service port position, refer to "9.2. Cautions for handling stop valve" on page 128.
- Pressurize the liquid and gas pipes to 4.0 MPa (40 bar) (do not pressurize more than 4.0 MPa (40 bar)). If the pressure does not drop within 24 hours, the system passes the test. If the pressure drops, check where the nitrogen leaks from.
- Vacuum drying: Use a vacuum pump which can evacuate to –100.7 kPa (5 Torr, –755 mm Hg)
  1. Evacuate the system from the liquid and gas pipes by using a vacuum pump for more than 2 hours and bring the system to –100.7 kPa. After keeping the system under that condition for more than 1 hour, check if the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have leaks.
  2. Following should be executed if there is a possibility of moisture remaining inside the pipe (if piping work is carried out during the raining season or over a long period of time, rainwater may enter the pipe during work).

  After evacuating the system for 2 hours, pressurize the system to 0.05 MPa (vacuum break) with nitrogen gas and evacuate the system again using the vacuum pump for 1 hour to –100.7 kPa (vacuum drying). If the system cannot be evacuated to –100.7 kPa within 2 hours, repeat the operation of vacuum break and vacuum drying.
  Then, after leaving the system in vacuum for 1 hour, confirm that the vacuum gauge does not rise.

10. Additional refrigerant charge

- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum drying (see above).
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant (R410A) is charged.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When performing service on the unit requiring the refrigerant system to be opened, refrigerant must be evacuated according to local regulations.
- When the power is on, please close the front panel when leaving the unit.

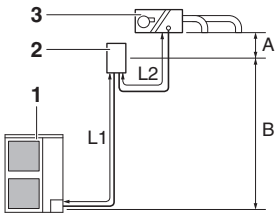
See figure 6.

1	Pressure reducing valve
2	Nitrogen
3	Tank
4	Siphon system
5	Measuring instrument
6	Vacuum pomp
7	Valve A
8	Gas line stop valve
9	Outdoor unit
10	Liquid line stop valve
11	Air handling unit
12	Stop valve service port
13	Charge hose

To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.

- This outdoor unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant. See "How to calculate the additional refrigerant to be charged" on page 130.
- In case re-charge is required, refer to the nameplate of the unit. The nameplate states the type of refrigerant and necessary amount.

Installation limitations



1	Outdoor unit
2	Valve kit
3	Air handling unit

	Max (m)	Min (m)
L1	50	5
L2	5	—
A	–5 / +5(*)	—
B	–35 / +35(*)	—

(*) Below or above the outdoor unit.

How to calculate the additional refrigerant to be charged

Additional refrigerant to be charged R (kg)
R should be rounded off in units of 0.1 kg

R=(Total length (m) of liquid piping size at Ø9.5)x0.054

Determine the weight of refrigerant to be charged additionally referring to the item "Additional refrigerant charge" in "How to calculate the additional refrigerant to be charged" on page 130 and fill in the amount in the "Additional refrigerant charge label" attached to the unit.

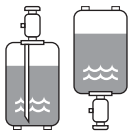
Precautions when adding R410A

Be sure to charge the specified amount of refrigerant in liquid state to the liquid pipe.

Since this refrigerant is a mixed refrigerant, adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

- Before charging, check whether the refrigerant cylinder is equipped with a siphon tube or not.

Charge the liquid refrigerant with the cylinder in upright position.



Charge the liquid refrigerant with the cylinder in up-side-down position.

10.1. Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

Refrigerant type: R410A
GWP(1) value: 1975

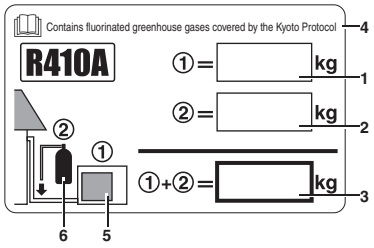
(1) GWP = global warming potential

Please fill in with indelible ink,

- ① the factory refrigerant charge of the product,
- ② the additional refrigerant amount charged in the field and
- ①+② the total refrigerant charge

on the fluorinated greenhouse gases label supplied with the product.

The filled out label must be adhered on the inside of the product and in the proximity of the product charging port (e.g. on the inside of the service cover).



1	factory refrigerant charge of the product: see unit name plate
2	additional refrigerant amount charged in the field
3	total refrigerant charge
4	Contains fluorinated greenhouse gases covered by the Kyoto Protocol
5	outdoor unit
6	refrigerant cylinder and manifold for charging

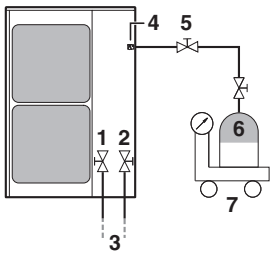
NOTE

National implementation of EU regulation on certain fluorinated greenhouse gases may require to provide the appropriate official national language on the unit. Therefore, an additional multilingual fluorinated greenhouse gases label is supplied with the unit.

Sticking instructions are illustrated on the backside of that label.

10.2. 2 procedures for adding refrigerant

How to connect the tank?



1	Liquid line stop valve
2	Gas line stop valve
3	To air handling unit
4	Service port for adding refrigerant
5	Valve A
6	R410A tank
7	Measuring instrument
8	Pipe fixing plate

When the refrigerant tank is connected and the specified operation is performed, the appropriate amount of refrigerant will be charged into the system. After charging, the system will stop automatically. The refrigerant must be charged according to the procedure described below.

Procedure 1: Charging while the outdoor unit is at a standstill

See figure 6.

1 Determine the weight of refrigerant to be charged additionally referring to the item "Additional refrigerant charge" in "How to calculate the additional refrigerant to be charged" on page 130 and fill in the amount in the "Additional refrigerant charge label" attached to the unit.

2 After the vacuum drying is finished, open valve A and charge the additional refrigerant in its liquid state through the service port on the liquid stop valve taking into account following instructions:
- Turn on the power of the outdoor unit, control box and air handling units.
- Check that gas and liquid stop valves are closed.
- Stop the compressor and charge the specified weight of refrigerant.

- To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.
- If the total refrigerant cannot be charged while the outdoor unit is at a standstill, it is possible to charge the refrigerant by operating the outdoor unit using the refrigerant charge function (refer to "Setting mode 2") and follow "Procedure 2: Charging while the outdoor unit is operating" on page 131.

Procedure 2: Charging while the outdoor unit is operating

See the figure in "How to connect the tank?" on page 131.

1 Completely open the gas side stop valve and liquid side stop valve. Valve A must be left fully closed.

2 Close the front panel and turn on the power to the control box, air handling unit and the outdoor unit.

3 Open valve A immediately after starting of the compressor.

4 Charge the additional refrigerant in its liquid state through the service port of the liquid line stop valve.

5 While the unit is at a standstill and under setting mode 2 (refer to Checks before initial start-up, "Setting the mode"), set the required function A (additional refrigerant charging operation) to **ON** (ON). Then operation starts. The blinking H2P led indicates test operation and the remote control indicates **TEST** (test operation) and [⅄] (external control).

6 When the specified amount of refrigerant is charged, push the **BS3 RETURN** button. Then operation stops.
- The operation automatically stops within 30 minutes.
- If the refrigerant charge cannot be finished within 30 minutes, repeat step 5.
- If the operation stops immediately after restart, there is a possibility that the system is overcharged.
  The refrigerant cannot be charged more than this amount.

7 After the refrigerant charge hose is removed, make sure to close valve A.

11. Electrical wiring work

- All wiring must be performed by an authorized electrician.
- All field supplied components and all electric construction should comply with the applicable local and national codes.

To persons in charge of electrical wiring work:

Do not operate the unit until the refrigerant piping is complete. (Running it before the piping is ready will break the compressor.)

11.1. Internal wiring – Parts table

L ..... Live
N ..... Neutral
..... Field wiring
..... Terminal strip
..... Connector
..... Protective earth (screw)
..... Connection
..... Relay connector
..... Functional earthing
..... Terminal
..... Movable connector
..... Fixed connector
BLU ..... Blue
BRN ..... Brown
GRN ..... Green
RED ..... Red

WHT.....White

YLW.....Yellow

ORG.....Orange

BLK.....Black

A1P.....Printed circuit board (main)

A2P.....Printed circuit board (inverter)

A3P.....Printed circuit board (noise filter)

A4P.....Printed circuit board (C/H selector)

BS1~BS5.....Push button switch (mode, set, return, test, reset)

C1~C3.....Capacitor

C4.....Capacitor

DS1.....DIP switch

E1HC.....Crankcase heater

F1U, F4U.....Fuse (T 6.3 A/250 V)

F6U.....Fuse (T 5.0 A/250 V)

FINTH.....Thermistor (fin)

H1P~H8P.....Light emitting diode (service monitor orange) Prepare, test: blinking

H2P.....Malfunction detection: light up

HAP.....Light emitting diode (service monitor green)

K1M.....Magnetic contactor (M1C)

K1R.....Magnetic relay (Y1S)

K2R.....Magnetic relay (Y2S)

K3R.....Magnetic relay (Y3S)

K4R.....Magnetic relay (E1HC)

K5R.....Magnetic relay

L1R.....Reactor

M1C.....Motor (compressor)

M1F.....Motor (fan) (upper)

M2F.....Motor (fan) (lower)

PS.....Switching power supply

Q1DI.....Field earth leakage breaker (300 mA)

R1.....Resistor (current limiting)

R2.....Resistor (current sensor)

R1T.....Thermistor (air)

R2T.....Thermistor (discharge)

R3T.....Thermistor (suction 1)

R4T.....Thermistor (heat exchanger)

R5T.....Thermistor (suction 2)

R6T.....Thermistor (subcooling heat exchanger)

R7T.....Thermistor (liquid pipe)

R8T.....Thermistor (liquid pipe 2)

S1NPH.....Pressure sensor (high)

S1NPL.....Pressure sensor (low)

S1PH.....Pressure switch (high)

V1R.....Power module

V2R, V3R.....Diode module

V1T.....IGBT (Insulated Gate Bipolar Transistor)

X1M.....Terminal strip (power supply)

X1M.....Terminal strip (C/H selector) (A4P)

X2M.....Terminal strip (control)

Y1E.....Electronic expansion valve (main)

Y3E.....Electronic expansion valve (subcool)

Y1S.....Solenoid valve (4 way valve)

Y2S.....Solenoid valve (hot gas)

Y3S.....Solenoid valve (unload circuit)

Z1C~Z8C.....Noise filter (ferrite core)

Z1F~Z4F.....Noise filter

Cool/heat selector

S1S.....Selector switch (fan/cool – heat)

S2S.....Selector switch (cool – heat)

Connector of option adapter

X37A.....Connector (option adapter power supply)

NOTE

- This wiring diagram only applies to the outdoor unit.
- Refer to the wiring diagram sticker (on the back of the front plate) for instructions on how to use BS1~BS5 and DS1-1, DS1-2 switches.
- Do not operate the unit by short-circuiting protection device S1PH.
- Refer to the installation manual for connection wiring to the control box.

11.2. Precautions on electrical wiring work

- Before obtaining access to terminal devices, all supply circuits must be interrupted.
- Use only copper wires.
- Do not turn on the main switch until all the wiring is completed. Make sure that the main switch has a contact separation of at least 3 mm in all poles.
- Never squeeze bundled cables into a unit.
- Secure the electrical wiring with clamping material as shown in figure 9 so that it does not come in contact with the piping, particularly on the high-pressure side.
  Make sure no external pressure is applied to the terminal connectors.
- When installing the earth leakage breaker make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the earth leakage breaker.
- As this unit is equipped with an inverter, installing a phase advancing capacitor not only will deteriorate power factor improvement effect, but also may cause capacitor abnormal heating accident due to high-frequency waves. Therefore, never install a phase advancing capacitor.
- Follow the "electrical wiring diagram" when carrying out any electrical wiring.
- Always ground wires. (In accordance with national regulations of the pertinent country.)
- Do not connect the ground wire to gas pipes, sewage pipes, lightning rods, or telephone ground wires.
  - Combustion gas pipes: can explode or catch fire if there is a gas leak.
  - Sewage pipes: no grounding effect is possible if hard plastic piping is used.
  - Telephone ground wires and lightning rods: dangerous when struck by lightning due to abnormal rise in electrical potential in the grounding.
- This unit uses an inverter, and therefore generates noise, which will have to be reduced to avoid interfering with other devices. The outer casing of the product may take on an electrical charge due to leaked electrical current, which will have to be discharged with the grounding.

11.3. Connection example of total system wiring

(See figure 8)

1 Power
2 Earth leakage breaker
3 Branch switch overcurrent breaker (fuse)
4 Ground
5 Communication wiring
6 Control box

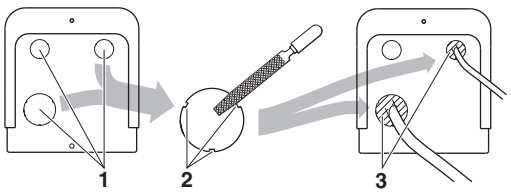
11.4. Connecting power wire and transmission wires

- Let the power wire (including ground wire) go through the power outlet port on either the front, side or back of the outdoor unit.
- Let the transmission wires go through the cable outlet port, pipe outlet port or knock out hole on either the front, side or back of the outdoor unit. (See figure 9).

A Rear direction
B Lateral direction
C Front direction
1 Power terminal block (X1M)
2 Control wiring between units
3 Power cable with ground wire. (Keep proper distance between power cable and control wiring).
4 Clamp (field supply)
5 Stop valve mounting plate
6 Power cable
7 Ground cable (yellow/green)
8 Fix the control wiring with the clamp
9 Control terminal block (X2M)

Precautions when knocking out knockout holes

- To punch a knock hole, hit on it with a hammer.
- After knocking out the holes, we recommend you paint the edges and areas around the edges using the repair paint to prevent rusting.
- When passing electrical wiring through the knock holes, remove any burrs from the knock holes and wrap the wiring with protective tape to prevent damage.
- If there is any possibility that small animals enter the system through the knock holes, plug the holes with packing materials (to be prepared on-site).



1 Knockout hole
2 Burr
3 Packing materials

- Use a power wire pipe for the power wiring.
- Outside the unit, make sure the low voltage electric wiring (i.e. for the remote control, between units, etc.) and the high voltage electric wiring do not pass near each other, keeping them at least 50 mm apart. Proximity may cause electrical interference, malfunctions, and breakage.
- Be sure to connect the power wiring to the power wiring terminal block and secure it as described under "11.4. Connecting power wire and transmission wires" on page 133.
- Inter-unit wiring should be secured as described in "11.4. Connecting power wire and transmission wires" on page 133.
  - Secure the wiring with clamps so that it does not touch the piping.
  - Make sure the wiring and the electric box lid do not stick up above the structure, and close the cover firmly.

11.5. Power circuit and cable requirements

A power circuit (see table below) must be provided for connection of the unit. This circuit must be protected with the required safety devices, i.e. a main switch, a slow blow fuse on each phase and an earth leakage breaker.

	ERQ100~140
Phase and frequency	1~ 50 Hz
Voltage	220-240 V
Recommended field fuse	32 A
Minimum circuit amps (MCA)(*)	27
Transmission line section	0.75~1.25 mm^2
Wire type(†)	H05VV

(*) Stated values are maximum values.
(†) Only in protected pipes, use H07RN-F when protected pipes are not used.

NOTE

- Select the power supply cable in accordance with relevant local and national regulations.
- Wire size must comply with the applicable local and national code.
- Specifications for local wiring power cord and branch wiring are in compliance with IEC60245.

- In connecting the power cable to the power terminal block, securely clamp the cable as shown in figure 9.

After finishing the electric work, confirm that each electric part and terminal inside the electric parts box is connected securely.

Equipment complying with EN/IEC 61000-3-12(1).

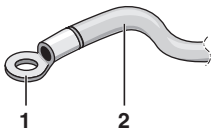
(1) European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase.

Precautions when laying power wiring

Use round pressure terminals for connections to the power terminal block.

When none are available, follow the instructions below.

- Do not connect wiring of different thicknesses to the power terminal block. (Slack in the power wiring may cause abnormal heat.)
- When connecting wiring which is the same thickness, do as shown in the figure below.



1 Round pressure terminal
2 Power wire

- For wiring, use the designated power wire and connect firmly, then secure to prevent outside pressure being exerted on the terminal board.
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.
- See the table below for tightening torque for the terminal screws.

Tightening torque (N•m)	
M5 (Power terminal block/ground wire)	2.39~2.92
M4 (Shielded ground)	1.18~1.44
M3.5 (Control wiring block)	0.79~0.97

Field line connection: Control wiring and cool/heat selection

If an excessive force is applied while connecting a cable to the terminal block on the PC board, the PC board may be damaged.

See figure 10.

1 Cool/heat selector
2 Outdoor unit PC board
3 Take care of the polarity
4 Use the conductor of sheathed wire (2 wire) (no polarity)
5 Terminal board (field supply)

Setting the cool/heat operation

1 Performing cool/heat setting with the remote control connected to the control box.

Keep the cool/heat selector switch (DS1-1) on the outdoor unit PC board at the factory setting position IN/D UNIT. (See figure 11).

2 Performing cool/heat setting with the cool/heat selector.

Connect the cool/heat selector remote control (optional) to the A/B/C terminals and set the cool/heat selector switch (DS1-1) on the outdoor unit PC board to OUT/D UNIT. (See figure 12).

1 Cool/heat selector

3 Perform cool/heat setting with the field supplied controller.

Set the cool/heat selector switch (DS1-1) on the outdoor unit PC board (A1P) to OUT/D UNIT. (See figure 12).
Connect the A/B/C terminals with the field supplied controller so that:

- A/B/C terminals are not connected for cooling operation
- A and C terminals are short-circuited for heating operation
- B and C are short-circuited for fan only operation

For low-noise operation or demand operation, it is necessary to get the optional 'External control adapter for outdoor unit' (DTA104A61/62).

For details, see the installation manual attached to the adapter.

- Be sure to follow the limits below. If the unit-to-unit cables are beyond these limits, it may result in malfunction of transmission.
  Maximum wiring length: F1/F2=100 m
- Never connect the power supply to unit-to-unit cabling terminal block. Otherwise the entire system may break down.

- The wiring from the air handling units must be connected to the F1/F2 (In-Out) terminals on the PC board in the outdoor unit.
- After installing the interconnecting wires inside the unit, wrap them along with the on-site refrigerant pipes using finishing tape, as shown in figure 13.

1 Liquid pipe
2 Gas pipe
3 Interconnecting wiring
4 Insulator
5 Finishing tape

For the above wiring, always use vinyl cords with 0.75 to 1.25 mm^2 sheath or cables (2-core wires). (3-core wire cables are allowable for the cooler/heater changeover remote control only.)

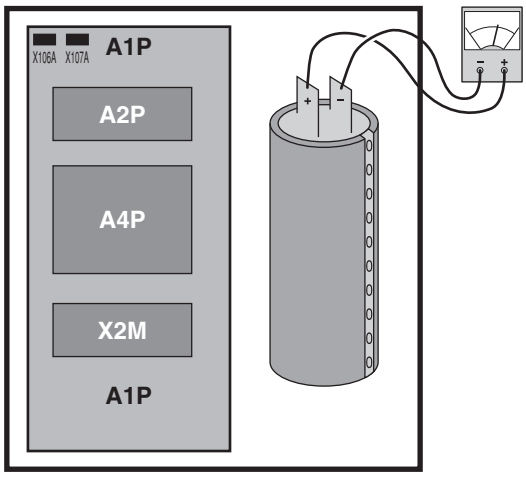
12. BEFORE OPERATION

12.1. Service precautions

WARNING: ELECTRIC SHOCK

Caution when performing service to inverter equipment

- Do not touch live parts for 10 minutes after the power supply is turned off because of high voltage risk.
- Additionally, measure the points as shown in the figure with a tester and confirm that the voltage of the capacitor in the main circuit is no more than 50 V DC.



- Make sure that the power supply is turned off before performing the maintenance work. The heater of the compressor may operate even in stop mode.
- Please note that some sections of the electric component box are extremely hot.
- In order to prevent damage to the PCB, first eliminate static electricity by touching a metal part (e.g. stop valve) with your hand. Then pull out the connector.
- After measuring the residual voltage, pull out the outdoor fan connector.
- Make sure you do not touch a conductive section.
- The outdoor fan may rotate due to strong backblow wind, causing the capacitor to charge. This may result in an electric shock.

After maintenance, make sure the outdoor fan connector is connected again. Otherwise, the unit may break down.

Play it safe!

Touch a metal part by hand (such as the stop valve) in order to eliminate static electricity and to protect the PCB before performing service.

12.2. Checks before initial start-up

NOTE

Note that during the first running period of the unit, required power input may be higher than stated on the nameplate of the unit. This phenomenon originates from the compressor that needs elapse of a 50 hours run in period before reaching smooth operation and stable power consumption.

- Make sure that the circuit breaker on the power supply panel of the installation is switched off.
- Attach the power wire securely.
- Introducing power with a missing N-phase or with a mistaken N-phase will break the equipment.

After the installation, check the following before switching on the circuit breaker:

1 Transportation stay

Be sure that the transportation stay is removed from the compressor.

2 The position of the switches that require an initial setting

Make sure that switches are set according to your application needs before turning the power supply on.

3 Power supply wiring and transmission wiring

Use a designated power supply and transmission wiring and make sure that it has been carried out according to the instructions described in this manual, according to the wiring diagrams and according to local and national regulations.

4 Pipe sizes and pipe insulation

Make sure that correct pipe sizes are installed and that the insulation work is properly executed.

5 Additional refrigerant charge

The amount of refrigerant to be added to the unit should be written on the included "Added Refrigerant" plate and attached to the rear side of the front cover.

6 Insulation test of the main power circuit

Using a megatester for 500 V, check that the insulation resistance of 2 MΩ or more is attained by applying a voltage of 500 V DC between power terminals and earth. Never use the megatester for the transmission wiring.

7 Stop valves

Be sure that the stop valves are open on both liquid and gas side.

8 Drain pipe installation

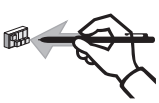
Make sure that the drain piping is installed properly.

12.3. Field setting

If required, carry out any field setting according to the following instructions. Refer to the service manual for more details.

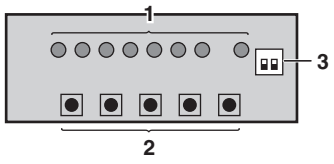
Handling the switches

When carrying out field settings, operate the switches with an insulated stick (such as a ball-point pen) to avoid touching of live parts.



Location of the DIP switches, leds and buttons

1 Led H1P~H8P
2 Push button switches BS1~BS5
3 DIP switches 2 (DS1-1, DS1-2)



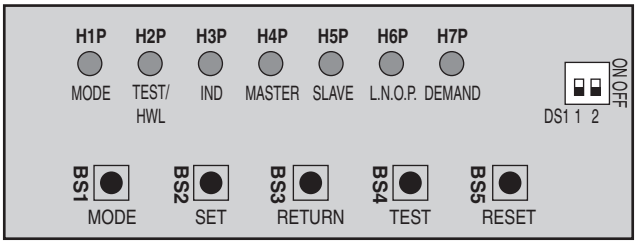
Led state

Throughout the manual the state of the leds is indicated as follows:

● OFF
☼ ON
◑ blinking

Setting the push button switch (BS1~5)

Function of the push button switch which is located on the outdoor unit PCB:



BS1 MODE	For changing the set mode
BS2 SET	For field setting
BS3 RETURN	For field setting
BS4 TEST	For test operation
BS5 RESET	For resetting the address when the wiring is changed or when an additional air handling unit is installed

The figure shows state of the led indications when the unit is shipped from the factory.

Setting the mode

The set mode can be changed with the **BS1 MODE** button according to the following procedure:

- **For setting mode 1**: Press the **BS1 MODE** button once, the H1P led is off ●.
- **For setting mode 2**: Press the **BS1 MODE** button for 5 seconds, the H1P led is on ☼.

If the H1P led is blinking ◑ and the **BS1 MODE** button is pushed once, it will change to setting mode 1.

NOTE If you get confused in the middle of the setting process, push the **BS1 MODE** button. Then it returns to setting mode 1 (H1P led is off).

Setting mode 1

The H1P led is off (COOL/HEAT selection setting).

Setting procedure

1 Push the **BS2 SET** button and adjust the led indication to either one of the possible settings as shown below in the field marked :

1 In case of COOL/HEAT setting by each individual outdoor unit circuit.

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
1	●	●	◑	●	●	●	●

2 Push the **BS3 RETURN** button and the setting is defined.

Setting mode 2

The H1P led is on.

Setting procedure

1 Push the **BS2 SET** button according to the required function (A~F). The led indication that matches the required function is shown below in the field marked :

Possible functions

A additional refrigerant charging operation (not applicable).
B refrigerant recovery operation/vacuuming operation.
C automatic low noise operation setting at nighttime.
D low noise operation level setting (**L.N.O.P**) via the external control adapter.
E power consumption limitation setting (**DEMAND**) via the external control adapter.
F enabling function of the low noise operation level setting (**L.N.O.P**) and/or power consumption limitation setting (**DEMAND**) via the external control adapter (DTA104A61/62).

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
A	☼	●	☼	●	☼	●	●
B	☼	●	☼	●	☼	●	☼
C	☼	●	☼	●	☼	☼	●
D	☼	●	☼	☼	●	●	☼
E	☼	●	☼	☼	☼	☼	●
F	☼	●	●	☼	☼	●	●

2 When the **BS3 RETURN** button is pushed, it indicates the current setting.

3 Push the **BS2 SET** button according to the required setting possibility as shown below in the field marked .

3.1 Possible settings for function A, B and F are **ON** (ON) or **OFF** (OFF).

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
ON	☼	●	●	●	●	◑	●
OFF(*)	☼	●	●	●	●	●	◑

(*) This setting = factory setting.

3.2 Possible settings for function C
The noise of level 3< level 2< level 1 (**1**).

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
OFF(*)	☼	●	●	●	●	●	●
1	☼	●	●	●	●	●	◑
2	☼	●	●	●	●	◑	●
3	☼	●	●	●	●	◑	◑

(*) This setting = factory setting.

3.3 Possible settings for function D and E

For function D (**L.N.O.P**) only: the noise of level 3< level 2< level 1 (◢ **1**).
For function E (**DEMAND**) only: the power consumption of level 1< level 2 < level 3 (◢ **3**).

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
◢ **1**	☼	●	●	●	●	●	◑
◢ **2** (*)	☼	●	●	●	●	◑	●
◢ **3**	☼	●	●	●	◑	●	●

(*) This setting = factory setting.

4 Push the **BS3 RETURN** button and the setting is defined.

5 When the **BS3 RETURN** button is pushed again, the operation starts according to the setting.

Refer to the service manual for more details and for other settings.

NOTE When finished, please mark the settings of function C, D and E in the "Records" part of the label on the backside of the front plate.

Confirmation of the set mode

The following items can be confirmed by setting mode 1 (H1P led is off)

Check the led indication in the field marked .

1 Indication of the present operation state

- ● normal
- ☼ abnormal
- ◑ under preparation or under test operation

H1P	H2P	H3P	H4P	H5P	H6P	H7P
●	●	☼	●	●	●	●

2 Indication of COOL/HEAT selection setting

1 When set to COOL/HEAT change-over by each individual outdoor unit circuit (= factory setting).

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
1(*)	●	●	☼	●	●	●	●

(*) This setting = factory setting.

3 Indication of low noise operation state **L.N.O.P**

- ● standard operation (= factory setting)
- ☼ **L.N.O.P** operation

H1P	H2P	H3P	H4P	H5P	H6P	H7P
●	●	☼	●	●	●	●

4 Indication of power consumption limitation setting **DEMAND**

- ● standard operation (= factory setting)
- ☼ **DEMAND** operation

H1P	H2P	H3P	H4P	H5P	H6P	H7P
●	●	☼	●	●	●	●

12.4. Test operation

NOTE
- After turning on the power supply, the unit can not be started until the H2P initialisation led goes off (maximum 12 minutes).
- Depending on the application, it is possible that the remote control is required for performing settings during first installation and servicing only (service tool).

- Check the stop valves
  Make sure to open the gas and liquid line stop valves.
- After installation, perform the test operation.
  Unless the test operation is performed, the error code "U3" is shown on the remote control and the unit cannot be operated.

Performing the test operation

1 To protect the compressor, make sure to turn on the power supply 6 hours before starting operation.

2 Set to setting mode 1 (H1P led is off) (refer to "Setting mode 1" on page 136).

3 Press the **BS4 TEST** button for 5 seconds when the unit is at a standstill. The test operation starts when the H2P led blinks and the remote control indicates **TEST** (test operation) and ⅄ (external control).

It may take 10 minutes to bring the state of refrigerant uniform before the compressor starts, but that is not a malfunction.
The test operation is automatically carried out in cooling mode during 15~30 minutes.
Depending on the situation, the refrigerant running sound or the sound of a magnetic solenoid valve may rise during this operation.
The following items are automatically checked:
- Check for incorrect wiring
- Check if stop valves are open
- Check of refrigerant charge
- Automatic judgement of piping length

NOTE When you want to terminate the test operation, press the **BS3 RETURN** button. The unit will keep running for 30 seconds and then stops. During test operation it is impossible to stop the unit with the remote control.

4 After the test operation (maximum 30 minutes), the unit automatically stops. Check the operation results by the outdoor unit led indication.

	H1P	H2P	H3P	H4P	H5P	H6P	H7P
normal	●	●	☼	●	●	●	●
abnormal	●	☼	●	●	●	●	●

- The led indication changes during this operation, but that is not abnormal.
- Please attach the front plate of the outdoor unit in order to prevent electric shocks.

5 Measure to be taken when operation finishes abnormally

1. Confirm the error code on the remote control.
2. Correct what is abnormal.
   (See the installation manual and operation manual or contact your dealer.)
3. After the abnormality is corrected, press the **BS3 RETURN** button and reset the error code.
4. Start the unit again to confirm that the problem is properly solved.
5. If no error code is indicated on the remote control, it is possible to start operation after 5 minutes.

Error codes on the remote control

Installation error	Malfunction code	Remedial action
The stop valve of an outdoor unit is left closed.	E3	Open the stop valve on both the gas and liquid side.
The stop valve of an outdoor unit is left closed.	E4 F3	Open the stop valve on both the gas and liquid side.
Insufficient refrigerant		Check if the additional refrigerant charge has been finished correctly. Recalculate the required amount of refrigerant from the piping length and add an adequate amount of refrigerant.
Refrigerant overcharge	E3 F6	Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
Insufficient supply voltage	U2	Check if the supply voltage is supplied properly.
The check operation is not performed.	U3	Perform the check operation.
No power is supplied to the outdoor unit.	U4	Check if the power wiring for the outdoor unit is connected correctly.
Improper type of air handling units are connected.	UA	Check the type of air handling units that are currently connected. If they are not proper, replace them with proper ones.
The stop valve of an outdoor unit is left closed.	UF	Open the stop valve on both the gas and liquid side.
The piping and wiring of the specified air handling unit are not connected correctly to the outdoor unit.		Confirm that the piping and wiring of the specified air handling unit are connected correctly to the outdoor unit.
Incorrect interconnections between units.	UH	Connect correctly the interconnections between units to the F1 and F2 (TO IN/D UNIT) terminals on the PC board in the outdoor unit.
Power supply cables are connected in the reverse phase instead of the normal phase.	U1	Connect the power supply cables in normal phase. Change any two of the three power supply cables (L1, L2, L3) to correct phase.

12.5. Checks in normal operation

In case of wired remote controls

- After the check operation, "CHANGEOVER UNDER CONTROL" is blinking in the connected remote control.
- Select an air handling unit to be used as the master unit.
- Press the operation mode selector button in the remote control of the air handling unit selected as the master unit.
- In that remote control, "CHANGEOVER UNDER CONTROL" disappears. That remote control will control changeover of the cooling/heating operation mode.

12.6. Temperature adjustment operation confirmation

After the test run is over, operate the unit normally. (Heating is not possible if the outdoor temperature is 24°C or higher.)

- Make sure the air handling and outdoor units are operating normally (If a knocking sound can be heard in the liquid compression of the compressor, stop the unit immediately and then energize the heater for a sufficient length of time before restarting the operation.)
- Check to see if cold (or hot) air is coming out of the air handling unit.

Cautions for normal operation check

- Once stopping, the compressor will not restart in about 5 minutes even if the Run/Stop button of an air handling unit in the same system is pressed.
- When the system operation is stopped by the remote control, the outdoor units may continue operating for a further 1 minute maximum.
- After the test run, when handling the unit over to the customer, make sure the electric box lid, the service lid and the unit casing are all attached properly.

13. SERVICE MODE OPERATION

After turning on the power supply, the unit can not be started until the H2P initialisation led, indicating that the unit is still under preparation, goes off (maximum 12 minutes).

Vacuuming method

At the first installation, this vacuuming is not required. It is required only for repair purposes.

1 When the unit is at a standstill and under the setting mode 2, set the required function B (refrigerant recovery operation/ vacuuming operation) to **ON** (ON).
- After this is set, do not reset the setting mode 2 until the vacuuming is finished.
- The H1P led is on and the remote control indicates **TEST** (test operation) and [人] (external control) and the operation will be prohibited.

2 Vacuum the system with a vacuum pump.

3 Press the **BS1 MODE** button and reset the setting mode 2.

Refrigerant recovery operation method by a refrigerant reclaimer.

1 When the unit is at a standstill and in setting mode 2, set the required function B (refrigerant recovery operation/vacuuming operation) to **ON** (ON).
- The air handling unit and the outdoor unit expansion valves will fully open and some solenoid valves will open.
- The H1P led is on and the remote control indicates **TEST** (test operation) and [人] (external control) and the operation will be prohibited.

2 Recover the refrigerant using a refrigerant reclaimer. For details, see the operation manual delivered with the refrigerant reclaimer.

3 Press the **BS1 MODE** button and reset the setting mode 2.

CAUTION

Never turn the power of the outdoor unit OFF while the refrigerant is being recovered.

If the power is turned OFF, the solenoid valves are closed and the refrigerant cannot be recovered from the outdoor unit.

14. CAUTION FOR REFRIGERANT LEAKS

(Points to note in connection with refrigerant leaks.)

14.1. Introduction

The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available.

The ERQ, like other air conditioning systems, uses R410A as refrigerant. R410A itself is an entirely safe non-toxic, non-combustible refrigerant. Nevertheless care must be taken to ensure that air conditioning facilities are installed in a room which is sufficiently large. This assures that the maximum concentration level of refrigerant gas is not exceeded, in the unlikely event of major leak in the system and this in accordance to the local applicable regulations and standards.

14.2. Maximum concentration level

The maximum charge of refrigerant and the calculation of the maximum concentration of refrigerant is directly related to the humanly occupied space in to which it could leak.

The unit of measurement of the concentration is kg/m^3 (the weight in kg of the refrigerant gas in 1 m^3 volume of the occupied space).

Compliance to the local applicable regulations and standards for the maximum allowable concentration level is required.

According to the appropriate European Standard, the maximum allowed concentration level of refrigerant to a humanly space for R410A is limited to 0.44 kg/m^3.

Pay special attention to places, such as a basements, etc. where refrigerant can stay, since refrigerant is heavier than air.

14.3. Procedure for checking maximum concentration

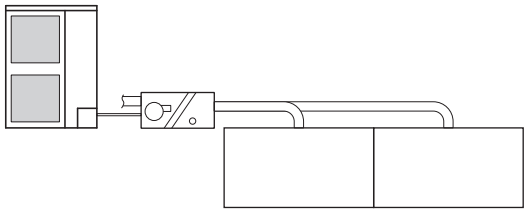
Check the maximum concentration level in accordance with steps 1 to 4 below and take whatever action is necessary to comply.

1 Calculate the amount of refrigerant (kg) charged to each system separately.

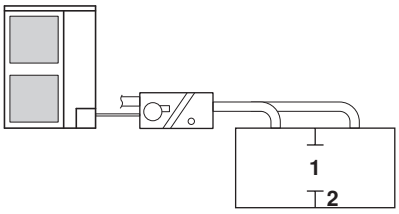
amount of refrigerant in a single unit system (amount of refrigerant with which the system is charged before leaving the factory) + additional charging amount (amount of refrigerant added locally in accordance with the length or diameter of the refrigerant piping) = total amount of refrigerant (kg) in the system

2 Calculate the smallest room volume (m^3)
In a case such as the following, calculate the volume of (A), (B) as a single room or as the smallest room.

A. Where there are no smaller room divisions



B. Where there is a room division but there is an opening between the rooms sufficiently large to permit a free flow of air back and forth.



1 opening between rooms

2 partition
(Where there is an opening without a door or where there are openings above and below the door which are each equivalent in size to 0.15% or more of the floor area.)

3 Calculating the refrigerant density using the results of the calculations in steps 1 and 2 above.

$$\frac{\text{total volume of refrigerant in the refrigerant system}}{\text{size (m}^3\text{) of smallest room in which there is an air handling unit installed}} \leq \text{maximum concentration level (kg/m}^3\text{)}$$

If the result of the above calculation exceeds the maximum concentration level then make similar calculations for the second then third smallest room and so until the result falls short of the maximum concentration.

4 Dealing with the situations where the result exceeds the maximum concentration level.

Where the installation of a facility results in a concentration in excess of the maximum concentration level then it will be necessary to revise the system.
Please consult your supplier.

15. DISPOSAL REQUIREMENTS

Dismantling of the unit, treatment of the refrigerant, of oil and of other parts must be done in accordance with relevant local and national legislation.

OPERATION MANUAL

Inverter condensing unit

Operation manual
Inverter condensing unit — **English**

Bedienungsanleitung
Invertierer Verflüssiger — **Deutsch**

Manuel d'utilisation
Groupe condenseur à inverter — **Français**

Gebruiksaanwijzing
Condensorunit met inverter — **Nederlands**

Manual de operación
Unidad condensadora Inverter — **Español**

Manuale d'uso
Unità di condensazione a inverter — **Italiano**

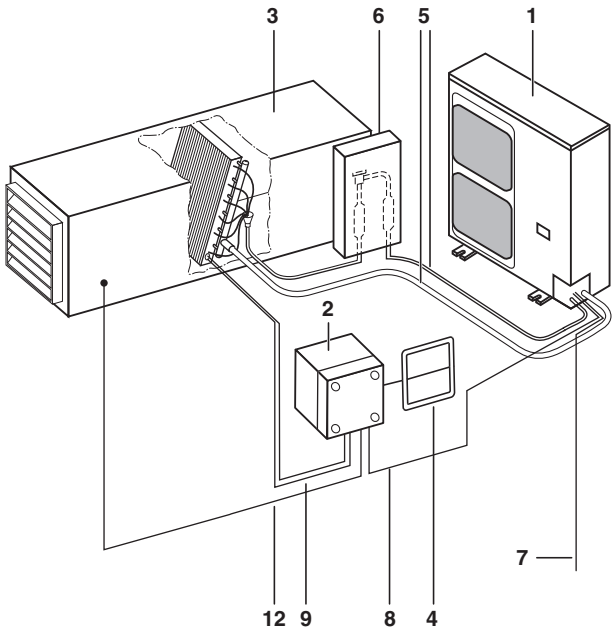
Manual de operações
Unidade de condensação com inversor — **Portugues**

Инструкция по эксплуатации
Инверторный конденсаторный агрегат — **русский**

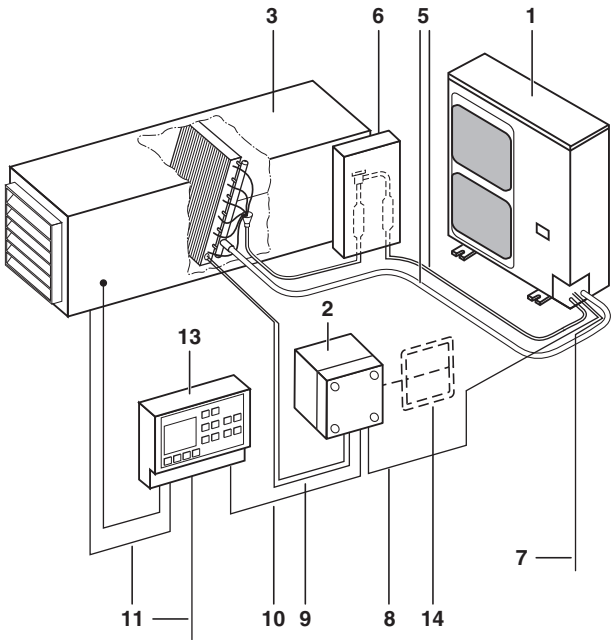
Instrukcja obs³ugi
Skraplacz typu Inverter — **polski**

ERQ100A7V1B
ERQ125A7V1B
ERQ140A7V1B

ERQ125A7W1B
ERQ200A7W1B
ERQ250A7W1B



1



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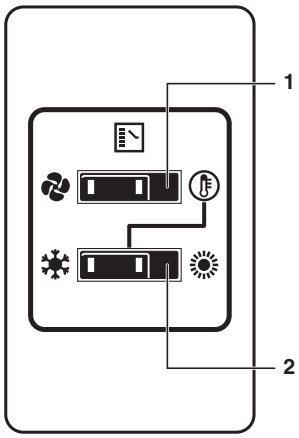

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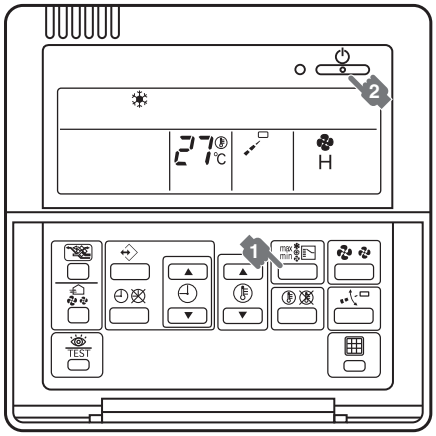

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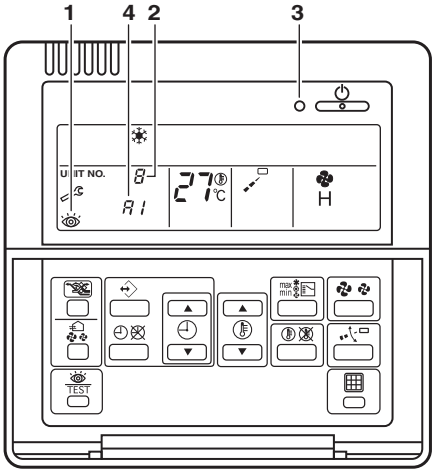

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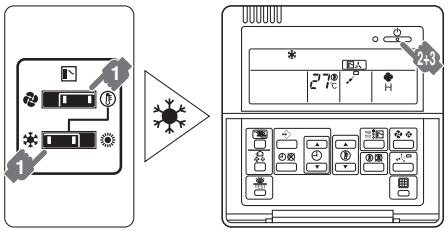

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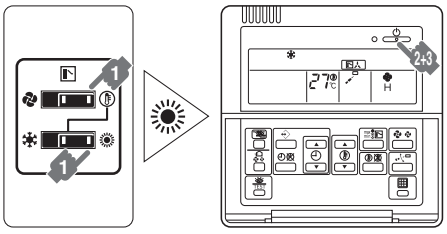

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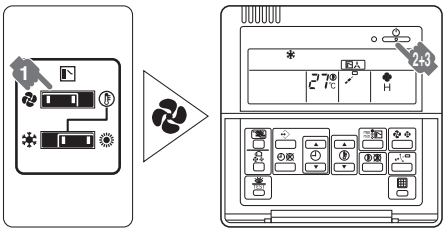

8

NOTES

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Thank you for purchasing this Daikin air conditioner. Carefully read this operation manual before using the air conditioner. It will tell you how to use the unit properly and help you if any trouble occurs. After reading the manual, file it away for future reference.

The English text is the original instruction. Other languages are translations of the original instructions.

1. SAFETY CAUTIONS

Read the following cautions carefully and use your equipment properly.

WARNING

Improper handling can lead to such serious consequences as death, severe injury or damage to the equipment.

NOTE

These instructions will ensure proper use of the equipment.

Be sure to follow these important safety cautions.

Keep these warning sheets handy so that you can refer to them if needed.

Also, if this equipment is transferred to a new user, make sure to hand over this user's manual to the new user.

Warnings

- It is not good for your health to expose your body to the air flow for a long time.
- In order to avoid electric shock, fire or injury, or if you detect any abnormality such as smell of fire, turn off the power supply and call your dealer for instructions.
- Ask your dealer for installation of the air conditioner.
  Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.
- Do not place objects in direct proximity of the outdoor unit and do not let leaves and other debris accumulate around the unit.
  Leaves are a hotbed for small animals which can enter the unit. Once in the unit, such animals can cause malfunctions, smoke or fire when making contact with electrical parts.
- Ask your dealer for improvement, repair, and maintenance.
  Incomplete improvement, repair, and maintenance may result in a water leakage, electric shock and fire.
- Do not insert fingers, rods or other objects into the air inlet or outlet. When the fan is rotating at high speed, it will cause injury.
- Never let the air handling unit or the remote control get wet.
  It may cause an electric shock or a fire.
- Never use a flammable spray such as hair spray, lacquer or paint near the unit.
  It may cause a fire.
- Never replace a fuse with that of wrong ampere ratings or other wires when a fuse blows out.
  Use of wire or copper wire may cause the unit to break down or cause a fire.
- Never put any objects into the air inlet or outlet.
  Objects touching the fan at high operating speed can be dangerous.
- Never press the button of the remote control with a hard, pointed object.
  The remote control may be damaged.
- Never pull or twist the electric wire of the remote control.
  It may cause the unit to malfunction.
- Never inspect or service the unit by yourself.
  Ask a qualified service person to perform this work.
- To prevent refrigerant leak, contact your dealer.
  When the system is installed and runs in a small room, it is required to keep the concentration of the refrigerant, if by any chance coming out, below the limit. Otherwise, oxygen in the room may be affected, resulting in a serious accident.
- The refrigerant in the air conditioner is safe and normally does not leak. If the refrigerant leaks in the room, contact with a fire of a burner, a heater or a cooker may result in a harmful gas.
  Turn off any combustible heating devices, ventilate the room and contact the dealer where you purchased the unit.
  Do not use the air conditioner until a service person confirms that the portion where the refrigerant leaks is repaired.
- Improper installation or attachment of equipment or accessories could result in electric shock, short-circuit, leaks, fire or other damage to the equipment. Be sure to use only accessories made by Daikin which are specifically designed for use with the equipment and have them installed by a professional.
- Ask your dealer to move and reinstall the air conditioner.
  Incomplete installation may result in a water leakage, electric shock, and fire.

Cautions

- Do not use the air conditioner for other purposes.
  In order to avoid any quality deterioration, do not use the unit for cooling precision instruments, food, plants, animals or works of art.
- In order to avoid injury, do not remove the fan guard of the outdoor unit.
- To avoid oxygen deficiency, ventilate the room sufficiently if equipment with burner is used together with the air conditioner.
- After a long use, check the unit stand and fitting for damage.
  If damaged, the unit may fall and result in injury.
- Do not place a flammable spray bottle near the air conditioner and do not use sprays.
  Doing so may result in a fire.
- Before cleaning, be sure to stop the operation, turn the breaker off or pull out the supply cord.
  Otherwise, an electric shock and injury may result.
- Do not operate the air conditioner with a wet hand.
  An electric shock may result.
- Do not place items which might be damaged by moisture under the air handling unit.
  Condensation may form if the humidity is above 80%, if the drain outlet is blocked or the filter is polluted.
- Do not place appliances which produce open fire in places exposed to the air flow from the unit or under the air handling unit. It may cause incomplete combustion or deformation of the unit due to the heat.
- Do not allow anyone to mount on the outdoor unit or avoid placing any object on it.
  Falling or tumbling may result in injury.
- Never expose little children, plants or animals directly to the air flow.
  Adverse influence to little children, animals and plants may result.
- Do not wash the air conditioner with water.
  Electric shock or fire may result.
- Do not install the air conditioner at any place where flammable gas may leak out.
  If the gas leaks out and stays around the air conditioner, a fire may break out.
- In order to avoid electric shock or fire, make sure that an earth leak detector is installed.
- Be sure the air conditioner is electrically earthed.
  In order to avoid electric shock, make sure that the unit is grounded and that the earth wire is not connected to gas or water pipe, lightning conductor or telephone earth wire.
- Arrange the drain hose to ensure smooth drainage. Incomplete drainage may cause wetting of the building, furniture etc.
- Do not let children play on and around the outdoor unit.
  If they touch the unit carelessly, it may result in injury.
- Do not place a flower vase or anything containing water on the unit.
  Water may enter the unit, causing an electric shock or fire.
- Do not place the controller exposed to direct sunlight.
  The LCD display may get discolored, failing to display the data.
- Do not wipe the controller operation panel with benzine, thinner, chemical dustcloth, etc.
  The panel may get discolored or the coating peeled off. If it is heavily dirty, soak a cloth in water-diluted neutral detergent, squeeze it well and wipe the panel clean. Wipe it with another dry cloth.
- Never touch the internal parts of the controller.
  Do not remove the front panel. Some parts inside are dangerous to touch and a machine trouble may happen. For checking and adjusting the internal parts, contact your dealer.
- Avoid placing the controller in a spot splashed with water.
  Water coming inside the machine may cause an electric leak or may damage the internal electronic parts.
- Do not operate the air conditioner when using a room fumigation - type insecticide.
  Failure to observe could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals.
- Do not touch the heat exchanger fins.
  These fins are sharp and could result in cutting injuries.
- This appliance is not intended for use by persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
  Children should be supervised to ensure that they do not play with the appliance.

2. IMPORTANT INFORMATION REGARDING THE REFRIGERANT USED

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol.

Refrigerant type: R410A
GWP(1) value: 1975

(1) GWP = global warming potential

Periodical inspections for refrigerant leaks may be required depending on European or local legislation. Please contact your local dealer for more information.

3. WHAT TO DO BEFORE OPERATION

This operation manual is for the following systems with standard control. Before initiating operation, contact your dealer for the operation that corresponds to your system type and mark.

If your installation has a customized control system, ask your dealer for the operation that corresponds to your system.

	Cool/heat changeover remote control switch		Operation modes
Heat pumps **ERQ_V1** series	❑ yes	❑ no	
Heat pumps **ERQ_W1** series	❑ yes	❑ no	

Example of installation

Names and functions of parts, figure 1 shows the standard control system, figure 2 shows the customized control system.

Parts and components

1	Outdoor unit
2	Control box
3	Air handling unit (field supply)
4	remote control (standard)
5	Field piping (field supply)
6	Expansion valve kit

Wiring connections

7	Outdoor unit power supply
8	Control box wiring (Power supply and communication between control box and outdoor unit)
9	Air handling unit thermistors
10	Communication between controller and control box
11	Power supply and control wiring for air handling unit and controller (power supply is separate from the outdoor unit)
12	Air thermistor control for air handling unit
13	Controller (field supply)
14	remote control (optional, for service only)

For more details, refer to the manual of the control box.

4. REMOTE CONTROL

Refer to the operation manual of the remote control.

5. CHANGEOVER SWITCH: NAME AND FUNCTION OF EACH SWITCH (See figure 3)

1 FAN ONLY/AIR CONDITIONING SELECTOR SWITCH

Set the switch to for fan only operation or to for heating or cooling operation.

2 COOL/HEAT CHANGEOVER SWITCH

Set the switch to for cooling or to for heating operation.

6. OPERATION RANGE

Operation range

Use the system in the following temperature and humidity ranges for safe and effective operation.

	ERQ125~250_W1		ERQ100~140_V1	
Outdoor temperature	–5~43°C DB	–20~21°C DB –20~15.5°C WB	–5~46°C DB	–20~24°C DB(*) –20~15.5°C WB
Indoor temperature	21~32°C DB 14~25°C WB	15~27°C DB	21~32°C DB 14~25°C WB	15~27°C DB
Indoor humidity	≤ 80%(†)		≤ 80%(†)	

(*) Range for operation: –20~–15°C WB. Range for continuous operation: –15~15.5°C WB.

(†) to avoid condensation and water dripping out the unit. If the temperature or the humidity is beyond these conditions, safety devices may work and the air conditioner may not operate.

7. OPERATION PROCEDURE

- Operation procedure varies according to the combination of outdoor unit and remote control. Read "3. What to do before operation" on page 143.
- To protect the unit, turn on the main power switch 6 hours before operation.
- If the main power supply is turned off during operation, operation will restart automatically after the power turns back on again.
- Refer to the manual supplied with the control box for operation and functionality.
- Refer to the manual supplied with the remote control for operation and functionality.

7.1. Cooling, heating, and fan only operation (See figure 4 and figure 6)

The fan may keep on running for a while after the heating operation stops.

For systems with Daikin remote control and without cool/heat changeover remote control switch (See figure 4)

1 Press the operation mode selector button several times and select the operation mode of your choice.

- Cooling operation
- Heating operation
- Fan only operation

2 Press the on/off button.

The operation lamp lights up and the system starts operation.

For systems with cool/heat changeover remote control switch

1 Select operation mode with the cool/heat changeover remote control switch as follows:

- Cooling operation (figure 6)
- Heating operation (figure 7)
- Fan only operation (figure 8)

2 Press the on/off button or close T1/T2.

The operation lamp lights up and the system starts operation.

For systems without Daikin remote control, without cool/heat changeover remote control swith and with a field supplied controller

1 Select operation mode with the field supplied controller.

2 Close T1/T2.

The operation lamp lights up and the system starts operation.

Adjustment

For programming temperature refer to the operation manual of the remote control.

Stopping the system

3 Press the on/off button once again or open T1/T2.

The operation lamp goes off and the system stops operation.

NOTE Do not turn off power immediately after the unit stops, but wait for at least 5 minutes.

Explanation of heating operation

It may take longer to reach the set temperature for general heating operation than for cooling operation.

The following operation is performed in order to prevent the heating capacity from dropping or cold air from blowing.

Defrost operation

- In heating operation, freezing of the outdoor unit coil increases. Heating capability decreases and the system goes into defrost operation.
- The air handling unit fan stops and the remote control displays .
- In case no remote control is installed, a defrost signal is outputted from the control box.
- After maximum 10 minutes of defrost operation, the system returns to heating operation again.

Hot start

In order to prevent cold air from blowing out of an air handling unit at the start of heating operation, the air handling unit fan can be stopped, depending on the control of the air handling unit.

In case a remote control is installed, the remote control displays . It may take some time before the fan starts. This is not a malfunction.

NOTE

- The heating capacity drops when the outside temperature falls. If this happens, use another heating device together with the unit. (When using together with appliances that produce open fire, ventilate the room constantly.)
  Do not place appliances that produce open fire in places exposed to the air flow from the unit or under the unit.
- It takes some time to heat up the room from the time the unit is started since the unit uses a hot-air circulating system to heat the entire room.
- If the hot air rises to the ceiling, leaving the area above the floor cold, we recommend that you use the circulator (the indoor fan for circulating air). Contact your dealer for details.

8. Energy saving and optimum operation

Observe the following precautions to ensure the system operates properly.

- Adjust the air outlet properly and avoid direct air flow to room inhabitants.
- Adjust the room temperature properly for a comfortable environment. Avoid excessive heating or cooling.
- Prevent direct sunlight from entering a room during cooling operation by using curtains or blinds.
- Ventilate often.
  Extended use requires special attention to ventilation.
- Keep doors and windows closed. If the doors and windows remain open, air will flow out of your room causing a decrease in the cooling or heating effect.
- Be careful not to cool or heat too much. To save energy, keep the temperature setting at a moderate level.

Recommended temperature setting	
For cooling	26~28°C
For heating	20~24°C

- Never place objects near the air inlet or the air outlet of the unit. It may cause deterioration in the effect or stop the operation.
- Turn off the main power supply switch to the unit when the unit is not used for longer periods of time. If the switch is on, it uses electricity. Before restarting the unit, turn on the main power supply switch 6 hours before operation to ensure smooth running. (Refer to "Maintenance" in the air handling unit manual.)
- Keep the air handling unit and remote control at least 1 m away from televisions, radios, stereos, and other similar equipment. Failing to do so may cause static or distorted pictures.
- Do not place items under the air handling unit which may be damaged by water.
  Condensation may form if the humidity is above 80% or if the drain outlet gets blocked.

9. Maintenance

Pay attention to the fan.

It is dangerous to inspect the unit while the fan is running. Be sure to turn off the main switch and to remove the fuses from the control circuit located in the outdoor unit.

9.1. Maintenance after a long stop period (e.g. at the beginning of the season)

- Check and remove everything that might be blocking inlet and outlet vents of air handling units and outdoor units.
- Clean air filters and casings of air handling units. Refer to the operation manual supplied with the air handling units for details on how to proceed and make sure to install cleaned air filters back in the same position.
- Turn on the power at least 6 hours before operating the unit in order to ensure smoother operation. As soon as the power is turned on, the remote control displays appear.

9.2. Maintenance before a long stop period (e.g. at the end of the season)

- Let the air handling units run in fan only operation for about half a day in order to dry the interior of the units. Refer to "7.1. Cooling, heating, and fan only operation" on page 144 for details on fan only operation.
- Turn off the power. The remote control displays disappear.
- Clean air filters and casings of air handling units. Refer to the operation manual supplied with the air handling units for details on how to proceed and make sure to install cleaned air filters back in the same position.

10. Following symptoms are not air conditioner troubles

Symptom 1: The system does not operate

- The air conditioner does not start immediately after the ON/OFF button on the remote control is pushed or T1/T2 is closed.
  If the operation lamp lights, the system is in normal condition.
  To prevent overloading of the compressor motor, the air conditioner starts 5 minutes after it is turned ON again in case it was turned OFF just before. The same starting delay occurs after the operation mode selector button was used.
- If "Centralized Control" is displayed on the remote control and pressing the operation button causes the display to blink for a few seconds.
  This indicates that the central device is controlling the unit.
  The blinking display indicates that the remote control cannot be used.
- The system does not start immediately after the power supply is turned on.
  Wait one minute until the micro computer is prepared for operation.

Symptom 2: Cool/Heat cannot be changed over

- When the display shows "" (change-over under centralized control), it shows that this is a slave remote control.
- When the cool/heat changeover remote control switch is installed and the display shows "".
  This is because cool/heat changeover is controlled by the cool/heat changeover remote control switch. Ask your dealer where the remote control switch is installed.

Symptom 3: Fan operation is possible, but cooling and heating do not work.

- Immediately after the power is turned on.
  The micro computer is getting ready to operate. Wait 10 minutes.

Symptom 4: White mist comes out of a unit

Symptom 4.1: Air handling unit

- When humidity is high during cooling operation
  If the interior of an air handling unit is extremely contaminated, the temperature distribution inside a room becomes uneven. It is necessary to clean the interior of the air handling unit. Ask your dealer for details on cleaning the unit. This operation requires a qualified service person.
- Immediately after the cooling operation stops and if the room temperature and humidity are low.
  This is because warm refrigerant gas flows back into the air handling unit and generates steam.

Symptom 4.2: Air handling unit, outdoor unit

- When the system is changed over to heating operation after defrost operation
  Moisture generated by defrost becomes steam and is exhausted.

Symptom 5: The remote control display reads "U4" or "U5" and stops, but then restarts after a few minutes

- This is because the remote control is intercepting noise from electric appliances other than the air conditioner. This prevents communication between the units, causing them to stop.
  Operation automatically restarts when the noise ceases.

Symptom 6: Noise of air conditioners

Symptom 6.1: Air handling unit, outdoor unit

- A continuous low hissing sound is heard when the system is in cooling or defrost operation.
  This is the sound of refrigerant gas flowing through both indoor and outdoor units.
- A hissing sound which is heard at the start or immediately after stopping operation or defrost operation.
  This is the noise of refrigerant caused by flow stop or flow change.

Symptom 6.2: Outdoor unit

- When the tone of operating noise changes.
  This noise is caused by the change of frequency.

Symptom 7: Dust comes out of the unit

- When the unit is used for the first time in a long time.
  This is because dust has gotten into the unit.

Symptom 8: The units can give off odours

- The unit can absorb the smell of rooms, furniture, cigarettes, etc., and then emit it again.

Symptom 9: The outdoor unit fan does not spin.

- During operation.
  The speed of the fan is controlled in order to optimize product operation.

Symptom 10: The display shows "88" . (Only when a remote control is connected)

- This is the case immediately after the main power supply switch is turned on and means that the remote control is in normal condition. This continues for one minute.

Symptom 11: The compressor in the outdoor unit does not stop after a short heating operation

- This is to prevent oil and refrigerant from remaining in the compressor. The unit will stop after 5 to 10 minutes.

Symptom 12: The inside of an outdoor unit is warm even when the unit has stopped

- This is because the crankcase heater is warming the compressor so that the compressor can start smoothly.

11. TROUBLESHOOTING

If one of the following malfunctions occur, take the measures shown below and contact your dealer.

WARNING

Stop operation and shut off the power if anything unusual occurs (burning smells, etc.)

Leaving the unit running under such circumstances may cause breakage, electric shock or fire.

Contact your dealer.

The system must be repaired by a qualified service person.

- If a safety device such as a fuse, a breaker or an earth leakage breaker frequently actuates or the ON/OFF switch does not properly work.
  Measure: Turn off the main power switch.
- If water leaks from the unit
  Measure: Stop the operation.
- The operation switch does not work well.
  Measure: Turn off the power.
- If the display TEST , the unit number and the operation lamp flash and the malfunction code appears. (Only when a remote control is connected) (See figure 5)

  1 Inspection display
  2 Air handling unit number in which a malfunction occurs
  3 Operation lamp
  4 Malfunction code

  Measure: Notify your dealer and report the malfunction code.

If the system does not properly operate except for the above mentioned cases and none of the above mentioned malfunctions is evident, investigate the system according to the following procedures.

1 If the system does not operate at all

- Check if there is no power failure.
  Wait until power is restored. If power failure occurs during operation, the system automatically restarts immediately after the power supply is recovered.
- Check if no fuse has blown or breaker has worked. Change the fuse or reset the breaker if necessary.

2 If the system goes into fan only operation, but as soon as it goes into heating or cooling operation, the system stops

- Check if air inlet or outlet of outdoor or air handling unit is not blocked by obstacles. Remove any obstacle and make it well-ventilated.

3 The system operates but cooling or heating is insufficient

- Check if air inlet or outlet of outdoor or air handling unit is not blocked by obstacles.
- Remove any obstacle and make it well-ventilated.
- Check if the air filter is not clogged. (Refer to "Maintenance" in the air handling unit manual.)
- Check the temperature setting.
- Check the fan speed setting on your remote control.
- Check for open doors or windows. Shut doors and windows to prevent wind from coming in.
- Check if there are too many occupants in the room during cooling operation
- Check if the heat source of the room is excessive.
- Check if direct sunlight enters the room. Use curtains or blinds.
- Check if the air flow angle is proper.

If after checking all above items, it is impossible to fix the problem yourself, contact your dealer and state the symptoms, the complete model name of the air conditioner (with manufacturing number if possible) and the installation date (possibly listed on the warranty card).

12. AFTER-SALES SERVICE AND WARRANTY

Warranty period

- This product includes a warranty card that was filled out by the dealer at the time of installation. The completed card was checked by the customer and stored carefully.
- If repairs to the air conditioner are necessary within the warranty period, contact your dealer and keep the warranty card at hand.

12.1. After-sales service

- Recommendations for maintenance and inspection
  Since dust collects when using the unit for several years, performance of the unit will deteriorate to some extent.
  As taking apart and cleaning interiors of units requires technical expertise and in order to ensure the best possible maintenance of your units, we recommend to enter into a maintenance and inspection contract on top of normal maintenance activities.
  Our network of dealers has access to a permanent stock of essential components in order to keep your air conditioner in operation as long as possible.
  Contact your dealer for more information.
- When asking your dealer for an intervention, always state:
  - the complete model name of the air conditioner
  - the manufacturing number (stated on the nameplate of the unit)
  - the installation date
  - the symptoms or malfunction, and details of the defect.

WARNING

- Do not modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electric shock or fire.
  Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and non-combustible, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. ... is present.
  Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

- Recommended inspection and maintenance cycles

Be aware that the mentioned maintenance and replacement cycles do not relate to the warranty period of the components.

Table 1: "Inspection Cycle" and "Maintenance Cycle" list

Component	Inspection cycle	Maintenance cycle (replacements and/or repairs)
Electric motor	1 year	20,000 hours
PCB		25,000 hours
Heat exchanger		5 years
Sensor (thermistor, etc.)		5 years
remote control and switches		25,000 hours
Drain pan		8 years
Expansion valve		20,000 hours
Electromagnetic valve		20,000 hours

Table 1 assumes the following conditions of use:

1. Normal use without frequent starting and stopping of the unit. Depending on the model, we recommend not starting and stopping the machine more than 6 times/hour.
2. Operation of the unit is assumed to be 10 hours/day and 2,500 hours/year.

NOTE

1. Table 1 indicates main components.
   Refer to your maintenance and inspection contract for more details.
2. Table 1 indicates recommended intervals of maintenance cycles. However, in order to keep the unit operational as long as possible, maintenance work may be required sooner.
   Recommended intervals can be used for appropriate maintenance design in terms of budgetting maintenance and inspection fees. Depending on the content of the maintenance and inspection contract, inspection and maintenance cycles may in reality be shorter than listed.

12.2. Shortening of "maintenance cycle" and "replacement cycle" needs to be considered in following situations

- The unit is used in locations where:

1. heat and humidity fluctuate out of the ordinary
2. power fluctuation is high (voltage, frequency, wave distortion, etc.)
   (The unit cannot be used if power fluctuation is outside the allowable range.)
3. bumps and vibrations are frequent
4. dust, salt, harmful gas or oil mist such as sulfurous acid and hydrogen sulfide may be present in the air
5. the machine is started and stopped frequently or operation time is long (sites with 24 hour air-conditioning).

■ Recommended replacement cycle of wear parts

Table 2: "Replacement Cycle" list

Component	Inspection cycle	Maintenance cycle (replacements and/or repairs)
Air filter	1 year	5 years
High efficiency filter (Optional)		1 year
Fuse		10 years
Crankcase heater		8 years

NOTE

1. Table 2 indicates main components. Refer to your maintenance and inspection contract for more details.
2. Table 2 indicates recommended intervals of replacement cycles. However, in order to keep the unit operational as long as possible, maintenance work may be required sooner. Recommended intervals can be used for appropriate maintenance design in terms of budgetting maintenance and inspection fees.

Contact your dealer for details.

NOTE

Damage due to taking apart or cleaning interiors of units by anyone other than our authorised dealers may not be included in the warranty.

■ Moving and discarding the unit

- Contact your dealer for removing and reinstalling the total unit. Moving units requires technical expertise.
- This unit uses hydrofluorocarbon.
  Contact your dealer when discarding this unit. It is required by law to collect, transport and discard the refrigerant in accordance with the "hydrofluorocarbon collection and destruction" regulations.

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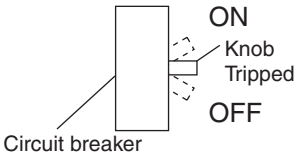
1. Symptom-based Troubleshooting

	Symptom		Supposed Cause	Countermeasure
1	The system does not start operation at all.		Blowout of fuse(s)	Turn Off the power supply and then replace the fuse(s).
			Cutout of breaker(s)	• If the knob of any breaker is in its OFF position, turn ON the power supply. • If the knob of any circuit breaker is in its tripped position, do not turn ON the power supply. 
			Power failure	After the power failure is reset, restart the system.
			Open phase in power supply cable	Check power supply. After that, properly connect the power supply cable, and then turn ON the power supply.
2	The system starts operation but makes an immediate stop.		Blocked air inlet or outlet of AHU or outdoor unit	Remove obstacle(s).
			Clogged air filter(s)	Clean the air filter(s).
3	The system does not cool or heat air well.		Blocked air inlet or outlet of AHU or outdoor unit	Remove obstacle(s).
			Clogged air filter(s)	Clean the air filter(s).
			Enclosed outdoor unit(s)	Remove the enclosure.
			Improper set temperature	Set the temperature to a proper degree.
			Airflow rate set to "LOW"	Set it to a proper airflow rate.
			Improper direction of air diffusion	Set it to a proper direction.
			Open window(s) or door(s)	Shut it tightly.
		[In cooling]	Direct sunlight received	Hang curtains or shades on windows.
		[In cooling]	Too many persons staying in a room	
		[In cooling]	Too many heat sources (e.g. OA equipment) located in a room	
4	The system does not operate.	The system stops and immediately restarts operation.	If the OPERATION lamp on the remote control turns ON, the system will be normal. These symptoms indicate that the system is controlled so as not to put unreasonable loads on the system.	Normal operation. The system will automatically start operation after a lapse of five minutes.
		Pressing the TEMP ADJUST button immediately resets the system.		
		The system stops immediately after turning ON the power supply.	The system is in preparation mode of micro computer operation.	Wait for a period of approximately one minute.
5	The system makes intermittent stops.	The remote control displays malfunction codes "U4" and "U5", and the system stops but restarts after a lapse of several minutes.	The system stops due to an interruption in communication between units caused by electrical noises coming from equipment other than air conditioners.	Remove causes of electrical noises. If these causes are removed, the system will automatically restart operation.
7	The system conducts fan operation but not cooling or heating operation.	This symptom occurs immediately after turning ON the power supply.	The system is in preparation mode of operation.	Wait for a period of approximately 10 minutes.

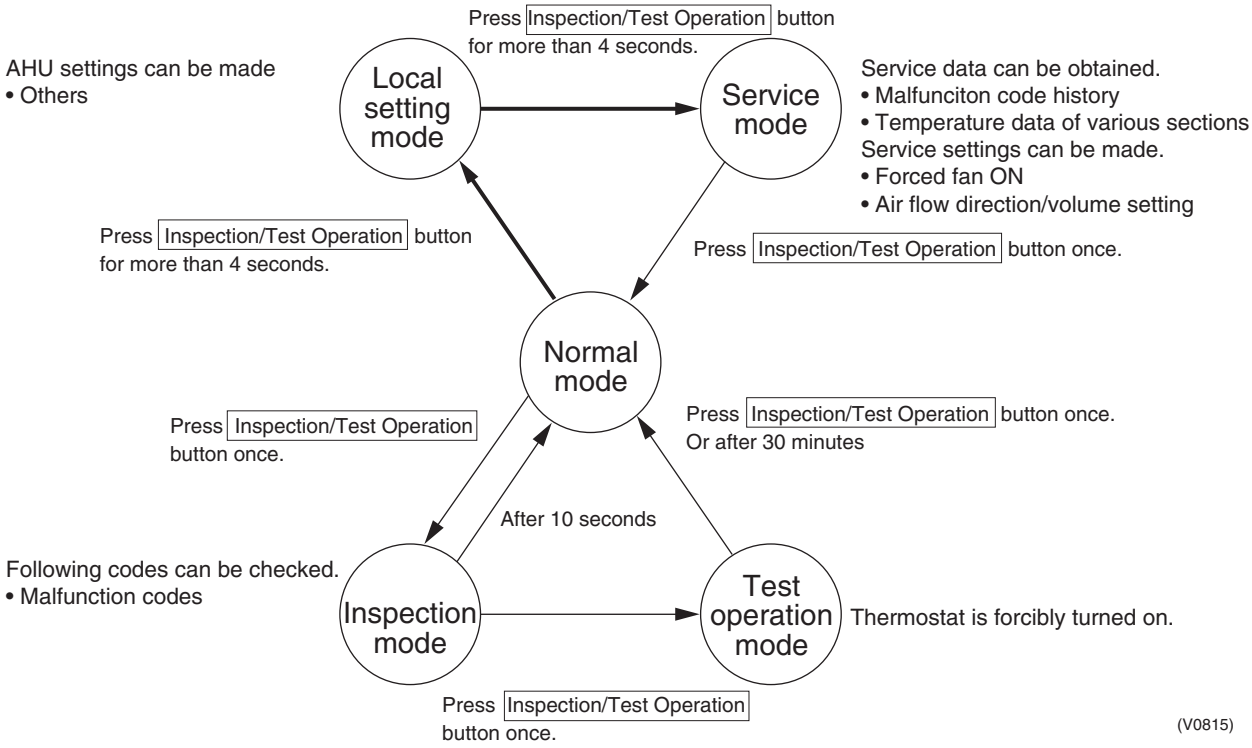
	Symptom		Supposed Cause	Countermeasure
8	The airflow rate is not reproduced according to the setting.	Even pressing the AIRFLOW RATE SET button makes no changes in the airflow rate.	In heating operation, when the room temperature reaches the set degree, the outdoor unit will stop while the AHU is brought to fan LL operation so that no one gets cold air. Furthermore, if fan operation mode is selected when other AHU is in heating operation, the system will be brought to fan LL operation. (The fan LL operation is also enabled while in oil return mode in cooling operation.)	Normal operation.
10	A white mist comes out from the system.	<AHU> In cooling operation, the ambient humidity is high. (This AHU is installed in a place with much oil or dust.)	Uneven temperature distribution due to heavy stain of the inside of the AHU	Clean the inside of the AHU.
		<AHU> Immediately after cooling operation stopping, the ambient temperature and humidity are low.	Hot gas (refrigerant) flown in the AHU results to be vapor from the unit.	Normal operation.
		<AHUs and outdoor units> After the completion of defrosting operation, the system is switched to heating operation.	Defrosted moisture turns to be vapor and comes out from the units.	Normal operation.
11	The system produces sounds.	<AHU> Immediately after turning ON the power supply, AHU produces "ringing" sounds.	These are operating sounds of the electronic expansion valve of the AHU.	Normal operation. This sound becomes low after a lapse of approximately one minute.
		<AHUs and outdoor units> "Hissing" sounds are continuously produced while in cooling or defrosting operation.	These sounds are produced from gas (refrigerant) flowing respectively through the AHUs and outdoor units.	Normal operation.
		<AHUs and outdoor units> "Hissing" sounds are produced immediately after the startup or stop of the system, or the startup or stop of defrosting operation.	These sounds are produced when the gas (refrigerant) stops or changes flowing.	Normal operation.
		<AHU> Faint sounds are continuously produced while in cooling operation or after stopping the operation.	These sounds are produced from the drain discharge device in operation.	Normal operation.
		<AHU> "Creaking" sounds are produced while in heating operation or after stopping the operation.	These sounds are produced from resin parts expanding and contracting with temperature changes.	Normal operation.
		<AHU> Sounds like "trickling" or the like are produced from AHUs in the stopped state.	On VRV systems, these sounds are produced when other AHUs in operation. The reason is that the system runs in order to prevent oil or refrigerant from dwelling.	Normal operation.
		<Outdoor unit> Pitch of operating sounds changes.	The reason is that the compressor changes the operating frequency.	Normal operation.
12	Dust comes out from the system.	Dust comes out from the system when it restarts after the stop for an extended period of time.	Dust, which has deposited on the inside of AHU, is blown out from the system.	Normal operation.
13	Odors come out from the system.	In operation	Odors of room, cigarettes or else adsorbed to the inside of AHU are blown out.	The inside of the AHU should be cleaned.
14	Outdoor unit fan does not rotate.	In operation	The reason is that fan revolutions are controlled to put the operation to the optimum state.	Normal operation.

	Symptom		Supposed Cause	Countermeasure
15	LCD display "88" appears on the remote control.	Immediately after turning ON the power supply	The reason is that the system is checking to be sure the remote control is normal.	Normal operation. This code is displayed for a period of approximately one minute at maximum.
16	The outdoor unit compressor or the outdoor unit fan does not stop.	After stopping operation	It stops in order to prevent oil or refrigerant from dwelling.	Normal operation. It stops after a lapse of approximately 5 to 10 minutes.
17	The outdoor gets hot.	While stopping operation	The reason is that the compressor is warmed up to provide smooth startup of the system.	Normal operation.
18	Hot air comes out from the system even though it stops.	Hot air is felt while the system stops.	On VRV systems, small quantity of refrigerant is fed to AHUs in the stopped state when other AHUs are in operation.	Normal operation.
19	The system does not cool air well.	The system is in dry operation.	The reason is that the dry operation serves not to reduce the room temperature where possible.	Change the system to cooling operation.

2. Troubleshooting by remote control

2.1 The INSPECTION / TEST Button

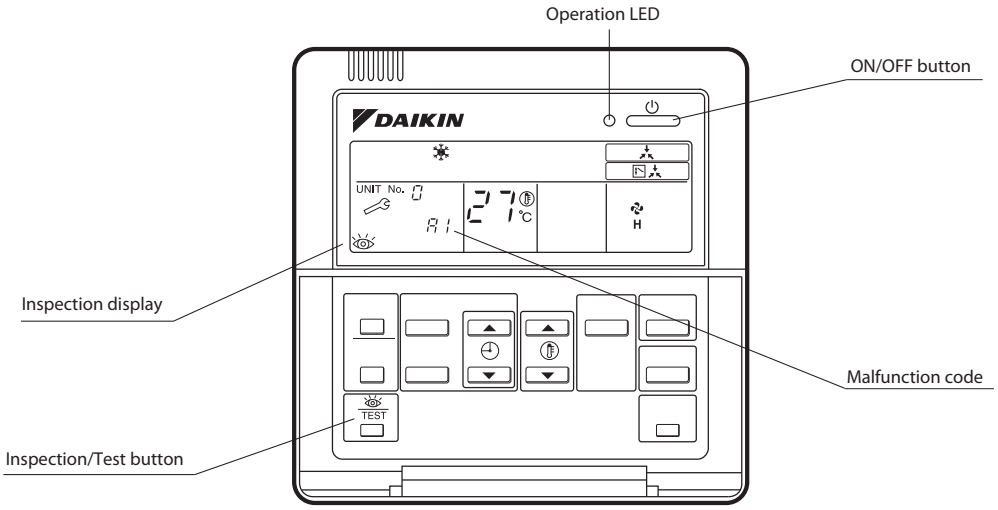
The following modes can be selected by using the [Inspection/Test Operation] button on the remote control.


Press Inspection/Test Operation button for more than 4 seconds.
AHU settings can be made
• Others
Local setting mode
Service mode
Service data can be obtained.
• Malfunciton code history
• Temperature data of various sections
Service settings can be made.
• Forced fan ON
• Air flow direction/volume setting
Press Inspection/Test Operation button for more than 4 seconds.
Press Inspection/Test Operation button once.
Normal mode
Press Inspection/Test Operation button once.
Press Inspection/Test Operation button once.
Or after 30 minutes
After 10 seconds
Following codes can be checked.
• Malfunction codes
Inspection mode
Test operation mode
Thermostat is forcibly turned on.
Press Inspection/Test Operation button once.
(V0815)

2.2 Self-diagnosis by Wired remote control

Explanation

If operation stops due to malfunction, the remote control's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when the inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 159 for malfunction code and malfunction contents.

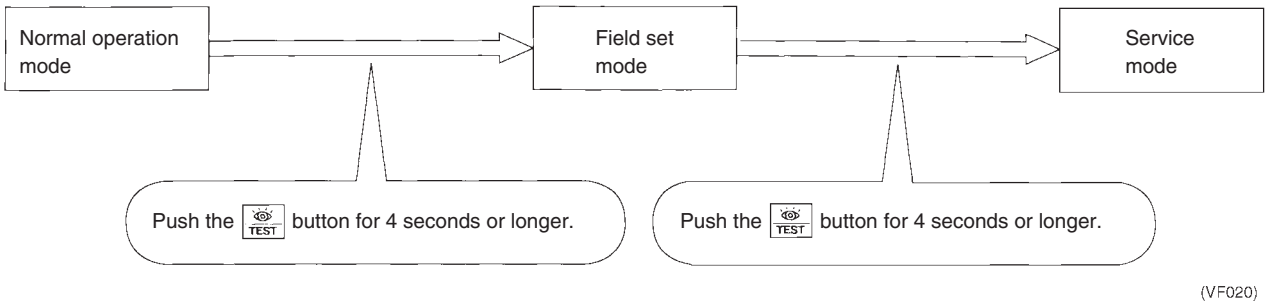


Note:

1. Pressing the INSPECTION/TEST button will blink the check indication.
2. While in check mode, pressing and holding the ON/OFF button for a period of five seconds or more will clear the failure history indication shown above. In this case, on the codes display, the malfunction code will blink twice and then change to "00" (=Normal), and the operation mode will automatically switch from check mode to normal mode (displaying the set temperature).

2.3 remote control Service Mode

How to Enter the Service Mode


Normal operation mode
Field set mode
Service mode
Push the TEST button for 4 seconds or longer.
Push the TEST button for 4 seconds or longer.
(VF020)

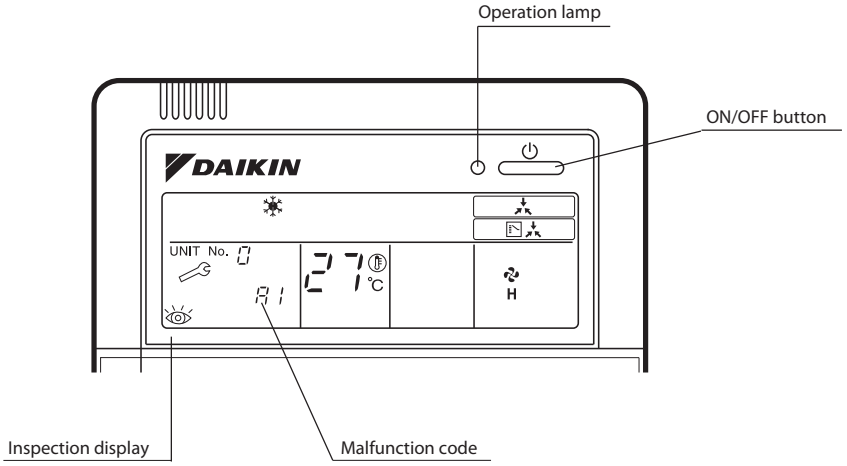
Service Mode Operation Method

1. Select the mode No.
Set the desired mode No. with the button.
2. Return to the normal operation mode.
Push the button one time.

Mode No	Function	Contents and operation method	remote control display example
40	Malfunction history display	Display malfunction history. The history No. can be changed with the button.	Unit 1 Malfunction code 40 2-U4 Malfunction code Hystory No: 1 - 9 1: Latest (VE007)
41	Display of sensor and address data	Display various types of data. Select the data to be displayed with the button. Sensor data 0: Thermostat sensor in remote control. 1: Suction (or level if DDC-controller connected. 00 = level 1 etc.) 2: Liquid pipe 3: Gas pipe Address data 8: Cool/heat group address 9: Demand / low noise address	Sensor data display Unit No. Sensor type 1 1 2 7 41 Temperature °C Address display Unit No. Address type 1 8 1 41 Address (VE008)
43	Forced fan ON	Manually turn the fan ON by each unit. (When you want to search for the unit No.) By selecting the unit No. with the button, you can turn the fan of each AHU on (forced ON) individually.	Unit 1 43 (VE009)

2.4 remote control Self-Diagnosis Function

The remote control switches are equipped with a self diagnosis function so that more appropriate maintenance can be carried out. If a malfunction occurs during operation, the operation lamp, malfunction code and display of malfunctioning unit No. let you know the contents and location of the malfunction.
When there is a stop due to malfunction, the contents of the malfunction given below can be diagnosed by a combination of operation lamp, INSPECTION display of the liquid crystal display and display of malfunction code.



(VL050)

☼: ON ●: OFF ☼: Blink

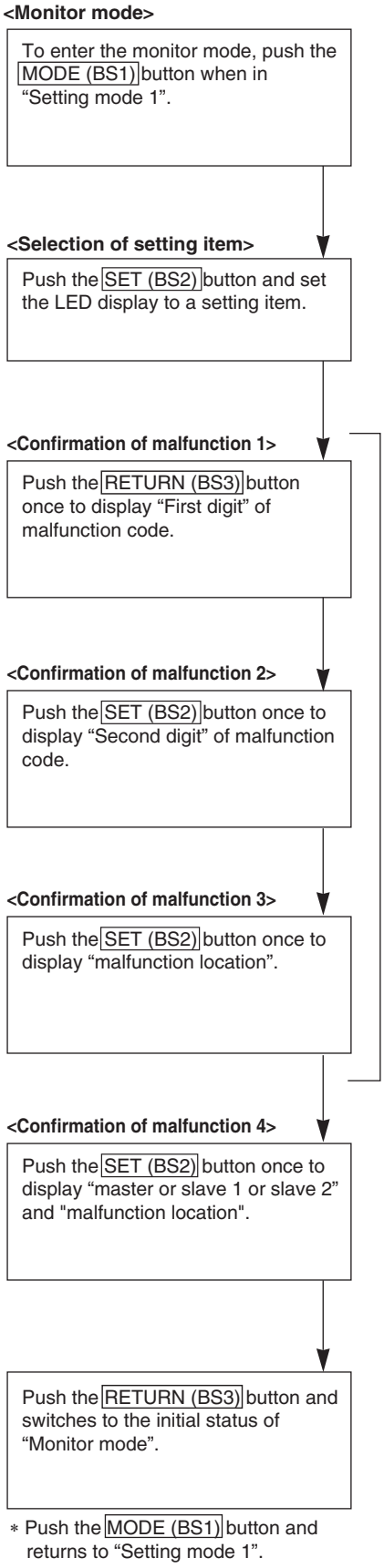
	Malfunction code	Operation lamp	Malfunction contents	Page Referred
AHU	A0	☼	Error of external protection device	165
	A1	☼	PC board defect, E^2 PROM defect	166
	A3	☼	Malfunction of drain level control system (S1L)	—
	A6	☼	Fan motor (M1F) lock, overload	167
	A8	☼	Abnormal power supply voltage	168
	A9	☼	Malfunction of moving part of electronic expansion valve (Y1E)	169
	AF	☼	Drain level above limit	—
	AJ	☼	Malfunction of capacity setting	171
	C1	☼	Failure of transmission (between AHU PC board and fan PC board)	172
	C4	☼	Malfunction of thermistor (R2T) for heat exchange (loose connection, disconnection, short circuit, failure)	174
	C5	☼	Malfunction of thermistor (R3T) for gas pipes (loose connection, disconnection, short circuit, failure)	175
	C6	☼	Failure of combination (between AHU PC board and fan PC board)	176
	C9	☼	Malfunction of thermistor (R1T) for suction air (loose connection, disconnection, short circuit, failure)	177
	CA	☼	Malfunction of thermistor for discharge air (loose connection, disconnection, short circuit, failure)	178
	CC	☼	Malfunction of humidity sensor system	179
	CJ	☼	Malfunction of thermostat sensor in remote control	180
Outdoor Unit	E1	☼	PC board defect	181
	E3	☼	Actuation of high pressure switch	182
	E4	☼	Actuation of low pressure sensor	184
	E5	☼	Compressor motor lock	186
	E6	☼	Standard compressor lock or over current	—
	E7	☼	Malfunction of outdoor unit fan motor	187
	E9	☼	Malfunction of moving part of electronic expansion valve (Y1E, Y3E)	188
	F3	☼	Abnormal discharge pipe temperature	190
	F6	☼	Refrigerant overcharged	191
	H3	☼	Failure of high pressure switch	—
	H4	☼	Actuation of low pressure switch	—
	H7	☼	Abnormal outdoor fan motor signal	—
	H9	☼	Malfunction of thermistor (R1T) for outdoor air (loose connection, disconnection, short circuit, failure)	192
	J2	☼	Current sensor malfunction	—
	J3	☼	Malfunction of discharge pipe thermistor (R2T) (loose connection, disconnection, short circuit, failure)	193
	J5	☼	Malfunction of thermistor (R3T, R5T) for suction pipe (loose connection, disconnection, short circuit, failure)	194
	J6	☼	Malfunction of thermistor (R6T) for heat exchanger (loose connection, disconnection, short circuit, failure)	195
	J7	☼	Malfunction of thermistor (R7T) for outdoor unit liquid pipe	196
	J9	☼	Malfunction of subcooling heat exchanger gas pipe thermistor (R4T)	197
	JA	☼	Malfunction of high pressure sensor	198
	JC	☼	Malfunction of low pressure sensor	199
	L0	☼	Inverter system error	—
	L1	☼	Malfunction of PC board	200
	L4	☼	Malfunction of inverter radiating fin temperature rise	201
	L5	☼	Inverter compressor abnormal	202
	L8	☼	Inverter current abnormal	203
	L9	☼	Inverter start up error	204

☼: ON ●: OFF ◑: Blink

	Malfunction code	Operation lamp	Malfunction contents	Page Referred
Outdoor Unit	LA	◑	Malfunction of power unit	—
	LC	◑	Malfunction of transmission between inverter and control PC board	205
	P1	◑	High voltage of capacitor in main inverter circuit.	206
System	U0	☼	Low pressure drop due to refrigerant shortage or electronic expansion valve failure	207
	U1	◑	Reverse phase / open phase	—
	U2	◑	Power supply insufficient or instantaneous failure	209
	U3	◑	Check operation is not completed.	211
	U4	◑	Malfunction of transmission between AHUs and outdoor units	212
	U5	●	Malfunction of transmission between remote control and AHU	214
	U5	◑	Failure of remote control PC board or setting during control by remote control	214
	U7	◑	Malfunction of transmission between outdoor units	—
	U8	◑	Malfunction of transmission between main and sub remote controls (malfunction of sub remote control)	215
	U9	◑	Malfunction of transmission between AHU and outdoor unit in the same system	—
	UA	◑	Excessive number of AHUs	215
	UC	☼	Address duplication of central remote control	216
	UE	◑	Malfunction of transmission between central remote control and AHU	—
	UF	◑	System is not set yet	216
	UH	◑	Malfunction of system, refrigerant system address undefined	217

The system operates for malfunction codes indicated in black squares, however, be sure to check and repair.

Malfunction code indication by outdoor unit PC board



Detail description on next page.

Contents of malfunction		Malfunction code
In-phase malfunction of DIII Net	Detection of DIII Net	E1
Abnormal discharge pressure	HPS activated	E3
Abnormal suction pressure	Abnormal Pe	E4
Compressor lock	Detection of INV compressor lock	E5
Over load, over current, abnormal lock of outdoor unit fan motor	Detection of DC fan 1 motor lock	E7
	Detection of DC fan 2 motor lock	
Malfunction of electronic expansion valve	EV1	E9
	EV3	
Faulty sensor of outdoor air temperature	Faulty Ta sensor (short)	H9
Abnormal discharge pipe temperature	Abnormal Td	F3
Abnormal heat exchanger temperature	Refrigerant over charge	F6
Faulty sensor of discharge pipe temperature	Faulty Tdi sensor (short)	J3
Faulty sensor of suction pipe temperature	Faulty Ts1 sensor (short)	J5
	Faulty Ts2 sensor (short)	
Faulty sensor of heat exchanger temperature	Faulty Tb sensor (short)	J6
Malfunction of the liquid pipe temperature sensor	Faulty TI sensor (short)	J7
Faulty sensor of subcool heat exchanger temperature	Faulty Tsh sensor (short)	J9
Faulty sensor of discharge pressure	Faulty Pc sensor (short)	JA
Faulty sensor of suction pressure	Faulty Pe sensor (short)	JC
Faulty Inverter PC board	Faulty IPM	L1
	Abnormal Current sensor offset	
	Abnormal IGBT	
	Faulty Current sensor	
	Abnormal SP-PAM over-voltage	
Inverter radiation fin temperature rising	Over heating of inverter radiation fin temperature	L4
DC output over current	Inverter instantaneous over current	L5
Electronic thermal	Electronic thermal switch 1	L8
	Electronic thermal switch 2	
	Out-of-step	
	Speed down after startup	
	Lightening detection	
Stall prevention (Limit time)	Stall prevention (Current increasing)	L9
	Stall prevention (Faulty start up)	
	Abnormal wave form in startup	
	Out-of-step	
Transmission error between inverter and outdoor unit	Inverter transmission error	LC

☼: ON ●: OFF ◑: Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3								Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P		H1P	H2P	H3P	H4P	H5P	H6P	H7P
E1	◑			●	●	◑	◑	◑			●	●	●	◑	◑	☼	●	●	●	●	●		◑	☼	☼	●	●	◑	◑
E3								◑			●	●	◑	◑	◑			●	●	●	●		◑			●	●		
E4								◑			●	◑	●	●	◑			●	●	●	●		◑			●	●		
E5								◑			●	◑	●	◑	◑			●	●	●	●		◑			●	●		
E7								◑			●	◑	◑	◑	◑			●	●	●	●		◑			●	◑	＊1	
															◑			●	●	●	◑		◑			●	◑		
E9								◑			◑	●	●	◑	◑			●	●	●	●		◑			●	●		
															◑			●	●	●	●		◑			◑	●		
H9								◑			◑	●	●	◑	◑			●	●	●	●		◑			●	●	＊1	
F3	◑			●	◑	●	◑	◑			●	●	◑	◑	◑			●	●	●	●		◑			●	●	＊1	
F6								◑			●	◑	◑	●	◑			●	●	●	●		◑			●	●	◑	◑
J3	◑			●	◑	◑	●	◑			●	●	◑	◑	◑			●	●	●	●		◑			●	●		
J5								◑			●	◑	●	◑	◑			●	●	●	●		◑			●	●		
															◑			●	●	●	●		◑			●	◑		
J6								◑			●	◑	◑	●	◑			●	●	●	●		◑			●	●		
J7								◑			●	◑	◑	◑	◑			●	●	●	●		◑			●	●	＊1	
J9								◑			◑	●	●	◑	◑			●	●	●	●		◑			●	●		
JA								◑			◑	●	◑	●	◑			●	●	●	●		◑			●	●		
JC								◑			◑	◑	●	●	◑			●	●	●	●		◑			●	●		
L1	◑			●	◑	◑	◑	◑			●	●	●	◑	◑			●	●	●	●		◑			●	●	●	●
								◑			●	●	●	◑	◑			●	●	●	●		◑			●	●	●	◑
								◑			●	●	●	◑	◑			●	●	●	●		◑			●	●	◑	●
								◑			●	●	●	◑	◑			●	●	●	●		◑			●	●	◑	◑
								◑			●	●	●	◑	◑			●	●	●	●		◑			●	◑	●	●
L4								◑			●	◑	●	●	◑			●	●	●	●		◑			●	●		
L5								◑			●	◑	●	◑	◑			●	●	●	●		◑			●	●		
L8								◑			◑	●	●	●	◑			●	●	●	●		◑			●	●		
															◑			●	●	●	●		◑			●	◑		
																		●	●	●	●								
															◑			●	●	●	●		◑			◑	●	＊1	
															◑			●	●	●	◑		◑			●	●		
L9								◑			◑	●	●	◑	◑			●	●	●	●		◑			●	●		
																		●	●	●	●					●	●		
															◑			●	●	●	●		◑			●	◑		
															◑			●	●	●	●		◑			◑	●		
LC								◑			◑	◑	●	●	◑			●	●	●	●		◑			●	◑		

Display of contents of malfunction (first digit)

Display of contents of malfunction (second digit)

Display 1 of malfunction in detail

Display 2 of malfunction in detail

＊1

●	●	Master
●	◑	Slave1
◑	●	Slave2
◑	◑	System

<Monitor mode>

To enter the monitor mode, push the MODE (BS1) button when in "Setting mode 1".

<Selection of setting item>

Push the SET (BS2) button and set the LED display to a setting item.

<Confirmation of malfunction 1>

Push the RETURN (BS3) button once to display "First digit" of malfunction code.

<Confirmation of malfunction 2>

Push the SET (BS2) button once to display "Second digit" of malfunction code.

<Confirmation of malfunction 3>

Push the SET (BS2) button once to display "malfunction location".

<Confirmation of malfunction 4>

Push the SET (BS2) button once to display "master or slave 1 or slave 2" and "malfunction location".

Push the RETURN (BS3) button and switches to the initial status of "Monitor mode".

∗ Push the MODE (BS1) button and returns to "Setting mode 1".

Detail description on next page.

Contents of malfunction		Malfunction code
Open phase/Power supply imbalance	Imbalance of inverter power supply voltage	P1
Faulty temperature sensor of inverter radiation fin	Faulty thermistor of inverter fin	P4
Refrigerant shortage	Refrigerant shortage alarm	U0
Abnormal power supply voltage	Insufficient Inverter voltage	U2
	Faulty charge of capacitor in main inverter circuit	
	Malfunction due to SP-PAM overvoltage	
	Malfunction due to P-N short circuit	
No implementation of test-run		U3
Transmission error between AHU and outdoor unit	I/O transmission error	U4
	I/O transmission error	
Transmission error of other system	AHU system abnormal in other system or other AHU system abnormal in own system	U9
Erroneous field setting	System transmission malfunction	UA
	Overconnection malfunction of AHUs	
	Malfunction of field setting	
	Refrigerant abnormal	
	Connection error (BP unit)	
Faulty system malfunction	Wiring error (Auto-address error)	UH
Conflict in wiring and piping, no setting for system	Conflict in wiring and piping	UF

☼: ON ●: OFF ◑: Blink

Malfunction code	Confirmation of malfunction 1							Confirmation of malfunction 2							Confirmation of malfunction 3							Confirmation of malfunction 4						
	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P	H1P	H2P	H3P	H4P	H5P	H6P	H7P
P1	◑			◑	●	●	●	◑			●	●	●	◑	◑			●	●	●	●	◑			●	●	∗1	
P4								◑			●	◑	●	●	◑			●	●	●	●	◑			●	●		
U0	◑			◑	●	●	◑	◑			●	●	●	●	◑			●	●	●	●	◑			●	●	◑	◑
U2								◑			●	●	◑	●	◑			●	●	●	●	◑			●	●	∗1	
															◑			●	●	●	●				●	◑		
															◑			●	●	●	●	◑			●	●	◑	●
															◑			●	●	●	●	◑			●	●	●	◑
U3								◑			●	●	◑	◑	◑			●	●	●	●	◑			●	●	◑	◑
															◑			●	●	●	●	◑			●	◑	◑	◑
U4								◑			●	◑	●	●	◑			●	●	●	●	◑			●	●	◑	◑
															◑			●	●	●	●	◑			●	◑	◑	◑
U9								◑			◑	●	●	◑	◑			●	●	●	●	◑			●	●	◑	◑
UA								◑			◑	●	◑	●	◑			●	●	●	●	◑			●	●	◑	◑
															◑			●	●	●	●	◑			●	◑	◑	◑
															◑			●	●	●	◑	◑			◑	●	◑	◑
															◑			●	●	◑	●	◑			●	◑	◑	◑
															◑			●	●	●	●	◑			●	●	◑	◑
UH								◑			◑	●	◑	◑	◑			●	●	●	●	◑			●	●	◑	◑
UF								◑			◑	◑	◑	◑	◑			●	●	●	●	◑			●	●	◑	◑

Display of contents of malfunction (first digit)

Display of contents of malfunction (second digit)

Display 1 of malfunction in detail

Display 2 of malfunction in detail

∗1

● ●	Master
● ◑	Slave1
◑ ●	Slave2
◑ ◑	System

3. Troubleshooting by Indication on the remote control

3.1 "A0" AHU: Error of External Protection Device

Remote control Display

A0

Applicable Models

All AHU models

Method of Malfunction Detection

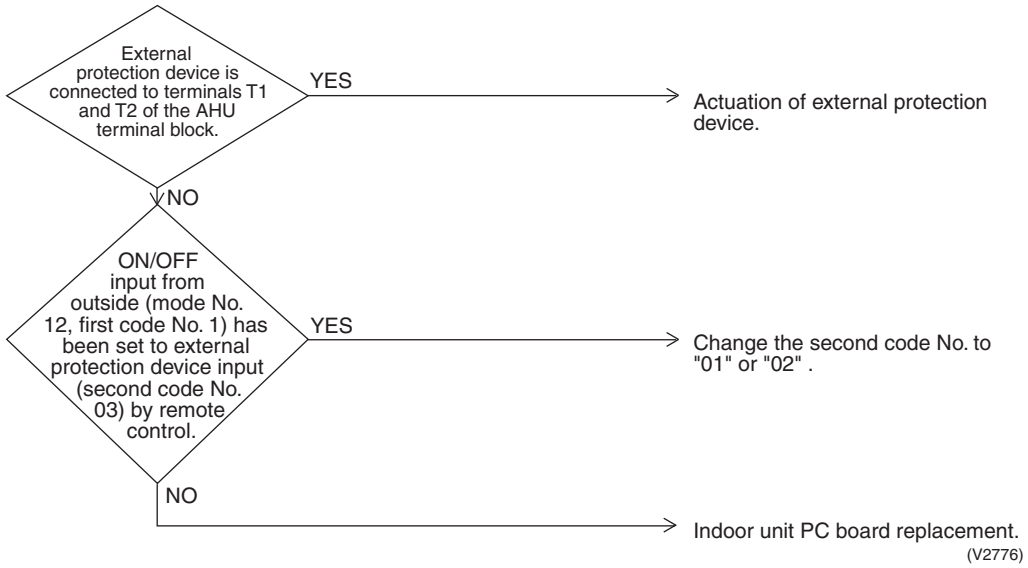
Malfunction Decision Conditions

Supposed Causes

- Actuation of external protection device
- Improper field set
- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occured.


External protection device is connected to terminals T1 and T2 of the AHU terminal block.
YES
Actuation of external protection device.
NO
ON/OFF input from outside (mode No. 12, first code No. 1) has been set to external protection device input (second code No. 03) by remote control.
YES
Change the second code No. to "01" or "02" .
NO
Indoor unit PC board replacement.
(V2776)

3.2 "A1" AHU: PC Board Defect

Remote control Display

A1

Applicable Models

All AHU models

Method of Malfunction Detection

Check data from E²PROM.

Malfunction Decision Conditions

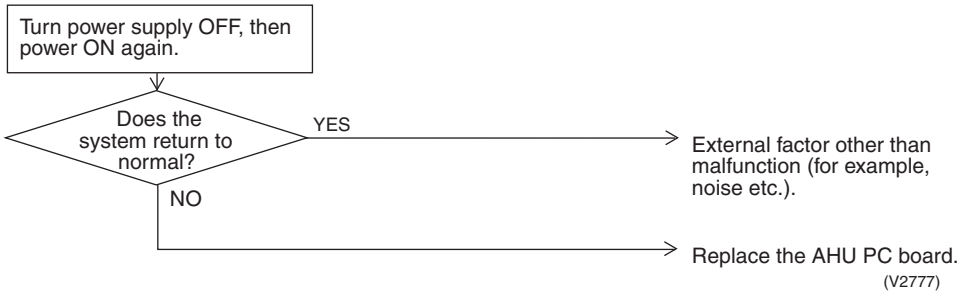
When data could not be correctly received from the E²PROM
E²PROM : Type of nonvolatile memory. Maintains memory contents even when the power supply is turned off.

Supposed Causes

- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occured.


Turn power supply OFF, then power ON again.
Does the system return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Replace the AHU PC board.
(V2777)

3.3 "A6" AHU: Fan Motor (M1F) Lock, Overload

Remote control Display

A6

Applicable Models

All AHU models

Method of Malfunction Detection

Detection by failure of signal for detecting number of turns to come from the fan motor

Malfunction Decision Conditions

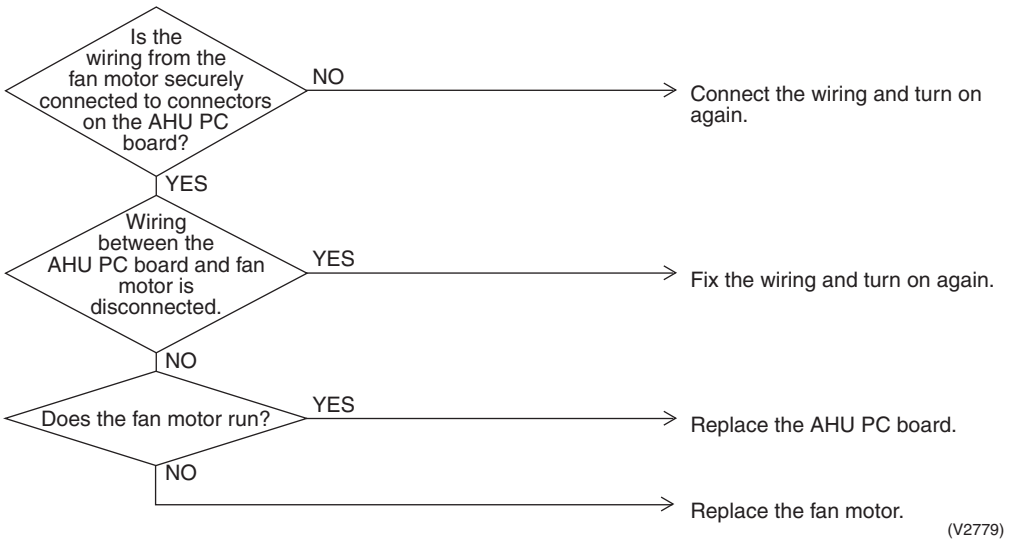
When number of turns can't be detected even when output voltage to the fan is maximum

Supposed Causes

- Fan motor lock
- Disconnected or faulty wiring between fan motor and PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occured.


Is the wiring from the fan motor securely connected to connectors on the AHU PC board?
NO
Connect the wiring and turn on again.
YES
Wiring between the AHU PC board and fan motor is disconnected.
YES
Fix the wiring and turn on again.
NO
Does the fan motor run?
YES
Replace the AHU PC board.
NO
Replace the fan motor.
(V2779)

3.4 Abnormal Power Supply Voltage

Remote control Display

A8

Applicable Models

FXMQ40~125P

Method of Malfunction Detection

Detect malfunction checking the input voltage of fan motor.

Malfunction Decision Conditions

When the input voltage of fan motor is 150V and below, or 386V and above.

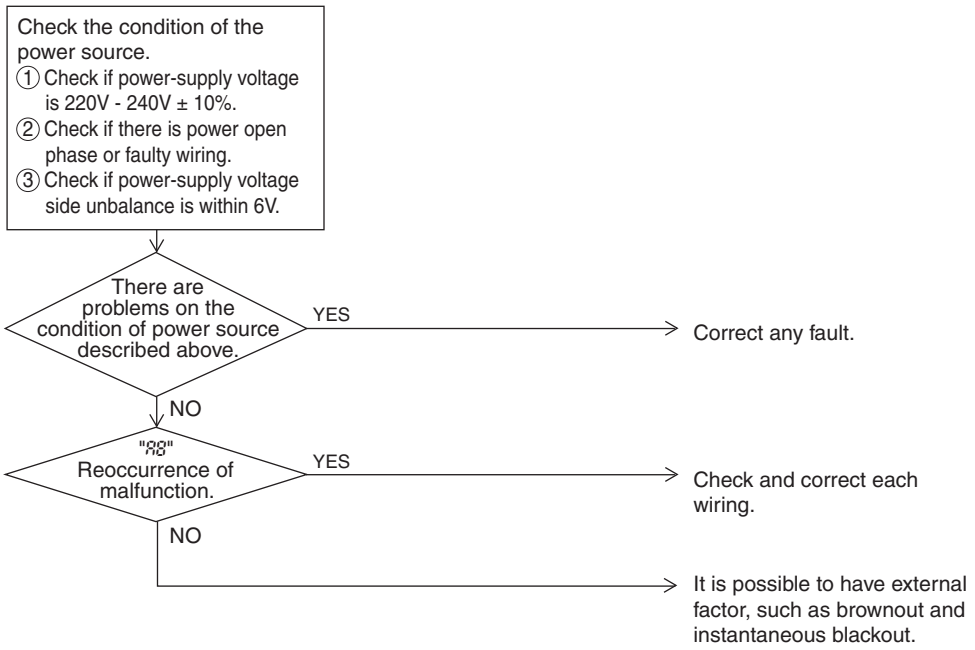
Supposed Causes

The possible causes are:

- Power-supply voltage malfunction.
- Connection defect on signal line.
- Wiring defect.
- Instantaneous blackout, others.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Check the condition of the power source.
① Check if power-supply voltage is 220V - 240V ± 10%.
② Check if there is power open phase or faulty wiring.
③ Check if power-supply voltage side unbalance is within 6V.
There are problems on the condition of power source described above.
YES
Correct any fault.
NO
"A8" Reoccurrence of malfunction.
YES
Check and correct each wiring.
NO
It is possible to have external factor, such as brownout and instantaneous blackout.

3.5 "A9" AHU: Malfunction of Moving Part of Electronic Expansion Valve (Y1E)

Remote control Display

A9

Applicable Models

All AHU models

Method of Malfunction Detection

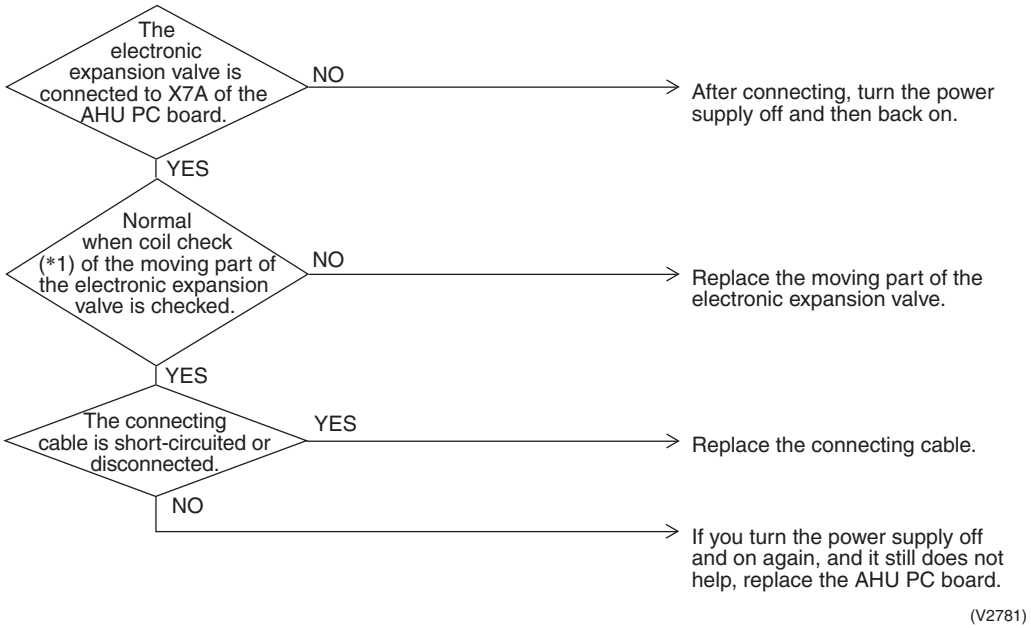
Malfunction Decision Conditions

Supposed Causes

- Malfunction of moving part of electronic expansion valve
- Defect of AHU PC board
- Defect of connecting cable

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The electronic expansion valve is connected to X7A of the AHU PC board.
NO
After connecting, turn the power supply off and then back on.
YES
Normal when coil check (*1) of the moving part of the electronic expansion valve is checked.
NO
Replace the moving part of the electronic expansion valve.
YES
The connecting cable is short-circuited or disconnected.
YES
Replace the connecting cable.
NO
If you turn the power supply off and on again, and it still does not help, replace the AHU PC board.

(V2781)

∗1: Coil check method for the moving part of the electronic expansion valve
Discount the electronic expansion valve from the PC board and check the continuity between the connector pins.

(Normal)

Pin No.	1. White	2. Yellow	3. Orange	4. Blue	5. Red	6. Brown
1. White		×	○ Approx. 300Ω	×	○ Approx. 150Ω	×
2. Yellow			×	○ Approx. 300Ω	×	○ Approx. 150Ω
3. Orange				×	○ Approx. 150Ω	×
4. Blue					×	○ Approx. 150Ω
5. Red						×
6. Brown						

○: Continuity
×: No continuity

3.6 "AJ" AHU: Malfunction of Capacity Determination Device

Remote control Display

AJ

Applicable Models

All AHU models

Method of Malfunction Detection

Capacity is determined according to resistance of the capacity setting adapter and the memory inside the IC memory on the AHU PC board, and whether the value is normal or abnormal is determined.

Malfunction Decision Conditions

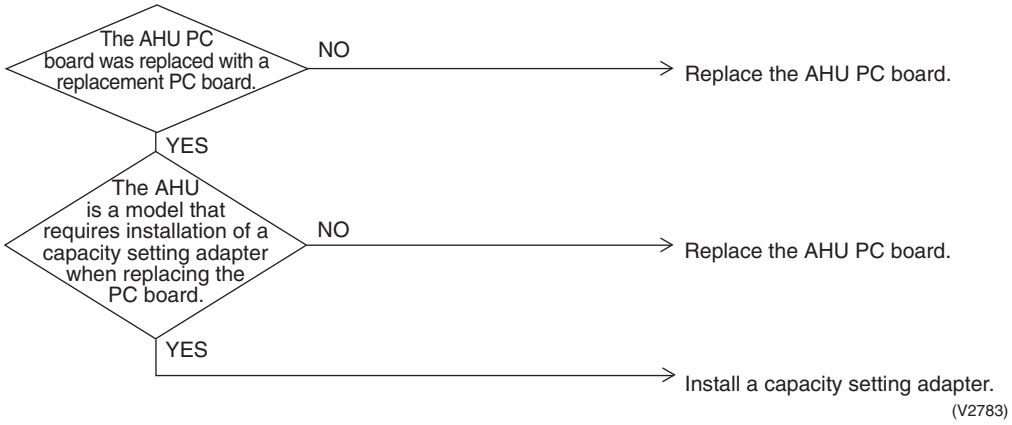
Operation and:
1. When the capacity code is not contained in the PC board's memory, and the capacity setting adapter is not connected.
2. When a capacity that doesn't exist for that unit is set.

Supposed Causes

- You have forgotten to install the capacity setting adapter.
- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The AHU PC board was replaced with a replacement PC board.
NO
Replace the AHU PC board.
YES
The AHU is a model that requires installation of a capacity setting adapter when replacing the PC board.
NO
Replace the AHU PC board.
YES
Install a capacity setting adapter.

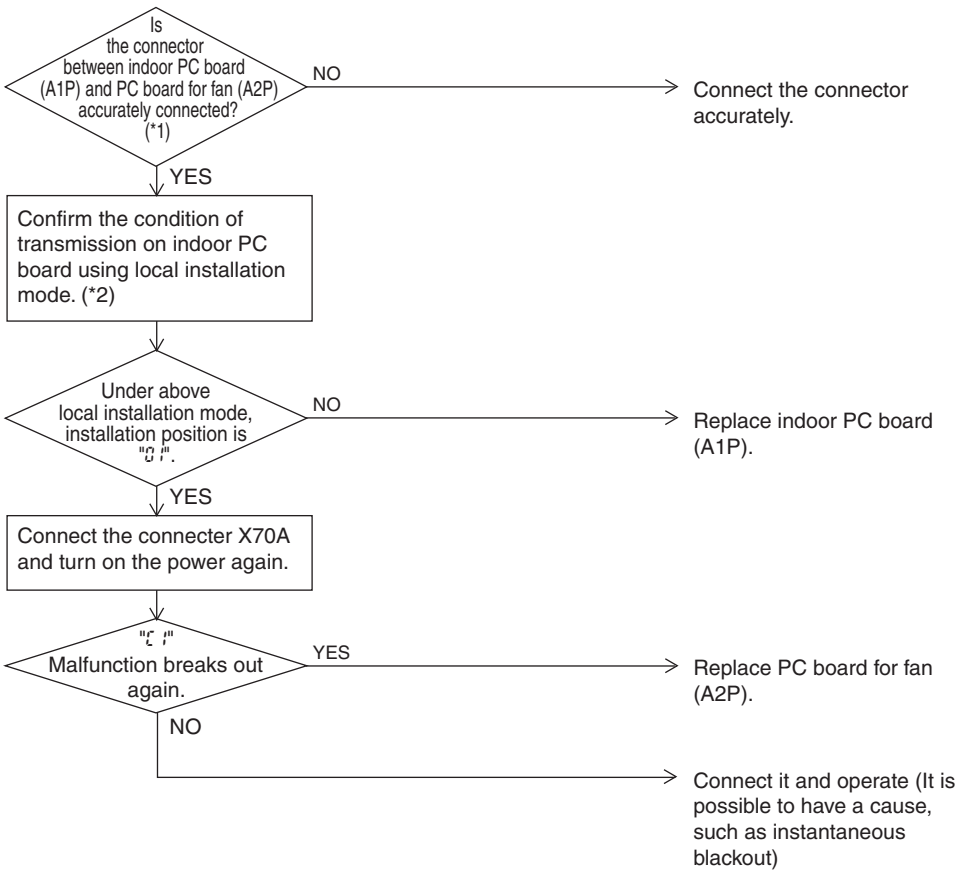
(V2783)

3.7 "C1" AHU: Failure of Transmission (Between AHU PC Board and Fan PC Board)

Remote control Display	C1
Applicable Models	FXMQ40~125P
Method of Malfunction Detection	Check the condition of transmission between indoor PC board (A1P) and PC board for fan (A2P) using computer.
Malfunction Decision Conditions	When normal transmission is not conducted for certain duration.
Supposed Causes	■ Connection defect of the connecter between indoor PC board (A1P) and PC board for fan (A2P). ■ Malfunction of indoor PC board (A1P). ■ Malfunction of PC board for fan (A2P). ■ External factor, such as instantaneous blackout.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the connector between indoor PC board (A1P) and PC board for fan (A2P) accurately connected? (*1)
NO
Connect the connector accurately.
YES
Confirm the condition of transmission on indoor PC board using local installation mode. (*2)
Under above local installation mode, installation position is "01".
NO
Replace indoor PC board (A1P).
YES
Connect the connecter X70A and turn on the power again.
"E 1" Malfunction breaks out again.
YES
Replace PC board for fan (A2P).
NO
Connect it and operate (It is possible to have a cause, such as instantaneous blackout)

∗1. Pull out and insert the connecter once and check it is absolutely connected.

∗2. Method to check transmission part of indoor PC board.

① Turn off the power and remove the connecter X70A of indoor PC board (A1P).

② Short-circuit X70A.

③ After turning on the power, check below numbers under local setting remote control. (Confirmation: Setting position NO. at the condition of setting switch No. 21 on mode No. 41)

↓

Determination
- 01: Normal
- Other than 01: Transmission defect on indoor PC board

★ After confirmation, turn off the power, take off the short-circuit and connect X70A back to original condition.

3.8 "C4" AHU: Malfunction of Thermistor (R2T) for Heat Exchanger

Remote control Display

C4

Applicable Models

All AHU models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by heat exchanger thermistor.

Malfunction Decision Conditions

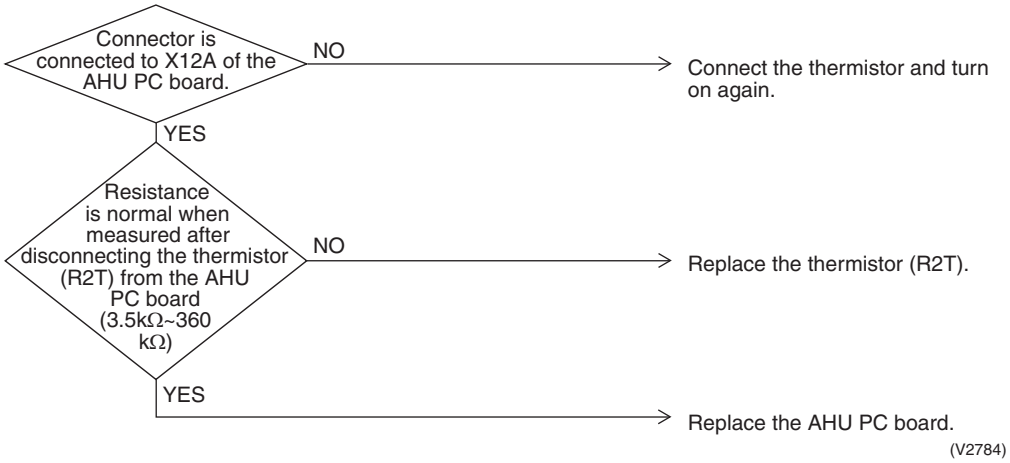
When the heat exchanger thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of thermistor (R2T) for liquid pipe
- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X12A of the AHU PC board.
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R2T) from the AHU PC board (3.5kΩ~360 kΩ)
NO
Replace the thermistor (R2T).
YES
Replace the AHU PC board.
(V2784)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.9 "C5" AHU: Malfunction of Thermistor (R3T) for Gas Pipes

Remote control Display

C5

Applicable Models

All AHU models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by gas pipe thermistor.

Malfunction Decision Conditions

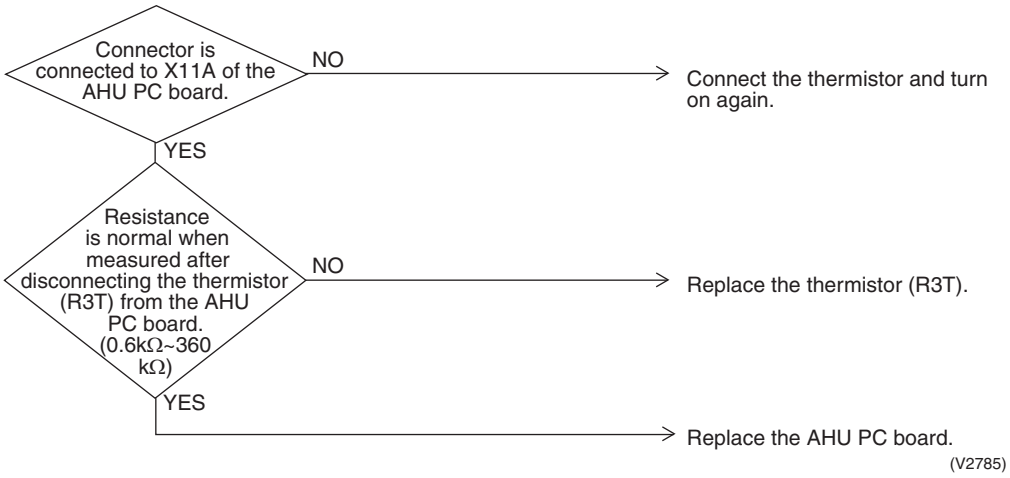
When the gas pipe thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of AHU thermistor (R3T) for gas pipe
- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X11A of the AHU PC board.
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R3T) from the AHU PC board. (0.6kΩ~360 kΩ)
NO
Replace the thermistor (R3T).
YES
Replace the AHU PC board.
(V2785)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.10 "C6" AHU: Failure of Combination (Between AHU PC Board and Fan PC Board)

Remote control Display

C6

Applicable Models

FXMQ40~125P

Method of Malfunction Detection

Conduct open line detection with PC board for fan (A2P) using indoor PC board (A1P).

Malfunction Decision Conditions

When the communication data of PC board for fan (A2P) is determined as incorrect.

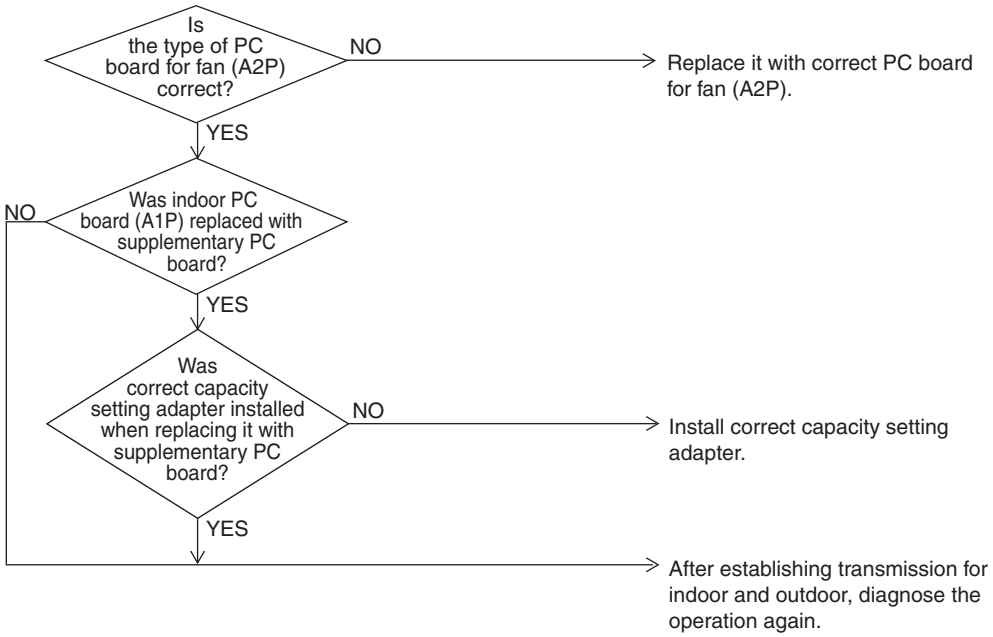
Supposed Causes

The possible causes are:

- Malfunction of PC board for fan (A2P).
- Connection defect of capacity setting adapter.
- Setting mistake on site.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the type of PC board for fan (A2P) correct?
NO
Replace it with correct PC board for fan (A2P).
YES
Was indoor PC board (A1P) replaced with supplementary PC board?
NO
YES
Was correct capacity setting adapter installed when replacing it with supplementary PC board?
NO
Install correct capacity setting adapter.
YES
After establishing transmission for indoor and outdoor, diagnose the operation again.

3.11 "C9" AHU: Malfunction of Thermistor (R1T) for Suction Air

Remote control Display

C9

Applicable Models

All AHU models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by suction air temperature thermistor.

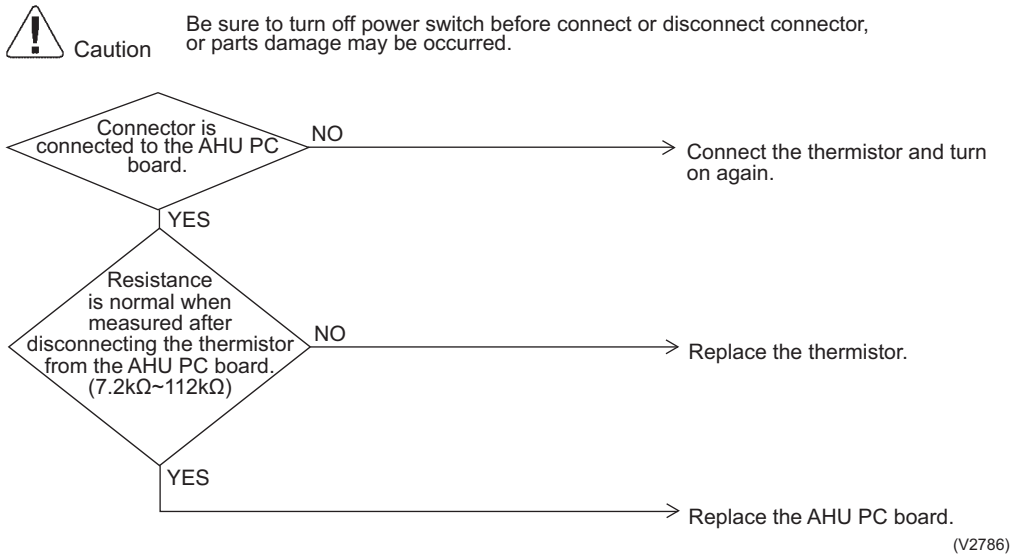
Malfunction Decision Conditions

When the suction air temperature thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of AHU thermistor (R1T) for air inlet
- Defect of AHU PC board

Troubleshooting


Caution
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.
Connector is connected to the AHU PC board.
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor from the AHU PC board. (7.2kΩ~112kΩ)
NO
Replace the thermistor.
YES
Replace the AHU PC board.
(V2786)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.12 "CA" AHU: Malfunction of Thermistor for Discharge Air

Remote control Display

CA

Applicable Models

All AHU models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by discharge air temperature thermistor.

Malfunction Decision Conditions

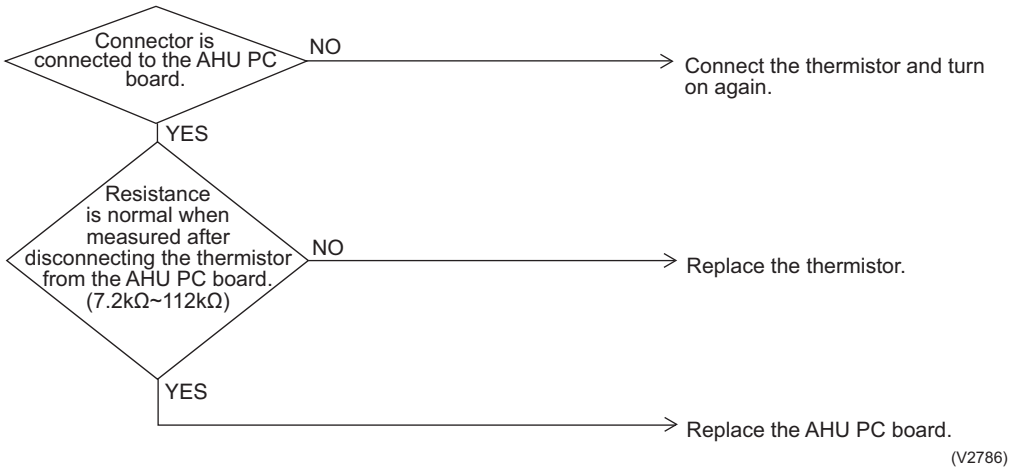
When the discharge air temperature thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of AHU thermistor for air outlet
- Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to the AHU PC board.
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor from the AHU PC board. (7.2kΩ~112kΩ)
NO
Replace the thermistor.
YES
Replace the AHU PC board.
(V2786)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.13 "CC" AHU: Malfunction of Humidity Sensor System

Remote control Display

CC

Applicable Models

FXFQ

Method of Malfunction Detection

Even if a malfunction occurs, operation still continues.
Malfunction is detected according to the moisture (output voltage) detected by the moisture sensor.

Malfunction Decision Conditions

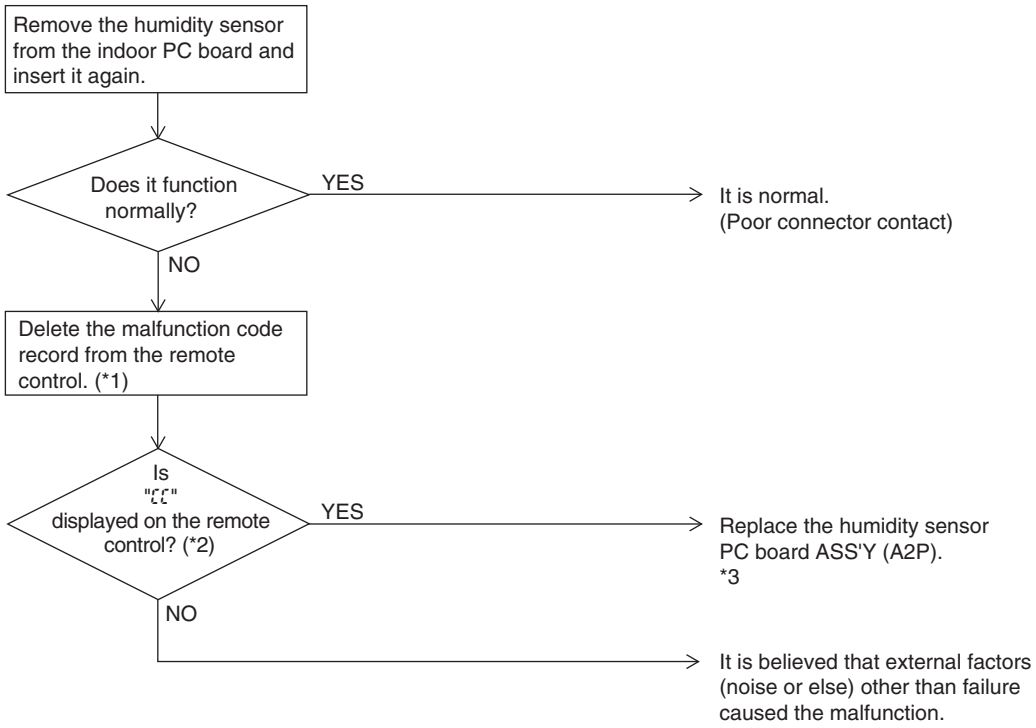
When the moisture sensor is disconnected or short-circuited

Supposed Causes

- Faulty sensor
- Disconnection

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Remove the humidity sensor from the indoor PC board and insert it again.
Does it function normally?
YES
It is normal.
(Poor connector contact)
NO
Delete the malfunction code record from the remote control. (*1)
Is "CC" displayed on the remote control? (*2)
YES
Replace the humidity sensor PC board ASS'Y (A2P).
*3
NO
It is believed that external factors (noise or else) other than failure caused the malfunction.

*1: To delete the record, the ON/OFF button of the remote control must be pushed and held for 5 seconds in the check mode.
*2: To display the code, the Inspection/Test Operation button of the remote control must be pushed and held in the normal mode.
*3: If "CC" is displayed even after replacing the humidity sensor PC board ASS'Y (A2P) and taking the steps *1 and 2, replace the indoor PC board ASS'Y (A1P).

3.14 "C4" AHU: Malfunction of Thermostat Sensor in remote control

Remote control Display

C4

Applicable Models

All AHU models

Method of Malfunction Detection

Malfunction detection is carried out by temperature detected by remote control air temperature thermistor. (Note1)

Malfunction Decision Conditions

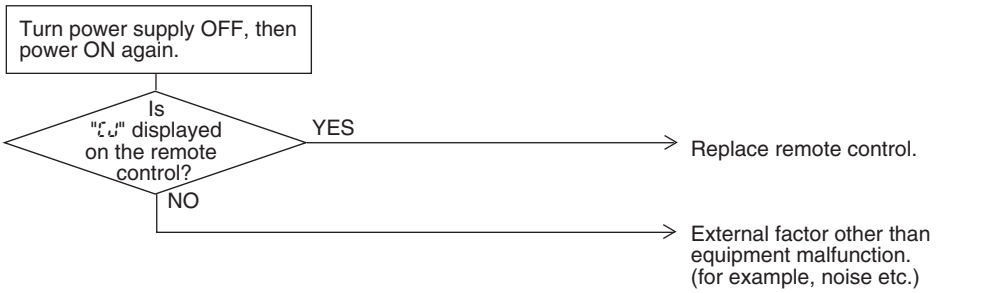
When the remote control air temperature thermistor becomes disconnected or shorted while the unit is running.

Supposed Causes

- Defect of remote control thermistor
- Defect of remote control PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Turn power supply OFF, then power ON again.
Is "C4" displayed on the remote control?
YES
Replace remote control.
NO
External factor other than equipment malfunction. (for example, noise etc.)

(V2787)

Note: In case of remote control thermistor malfunction, unit is still operable by suction air thermistor on AHU.

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.15 "E1" Outdoor Unit: PC Board Defect

Remote control Display

E1

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Check data from E²PROM

Malfunction Decision Conditions

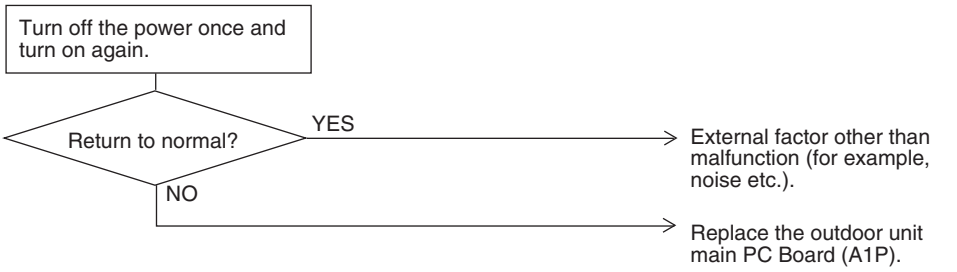
When data could not be correctly received from the E²PROM
E²PROM : Type of nonvolatile memory. Maintains memory contents even when the power supply is turned off.

Supposed Causes

- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Turn off the power once and turn on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Replace the outdoor unit main PC Board (A1P).

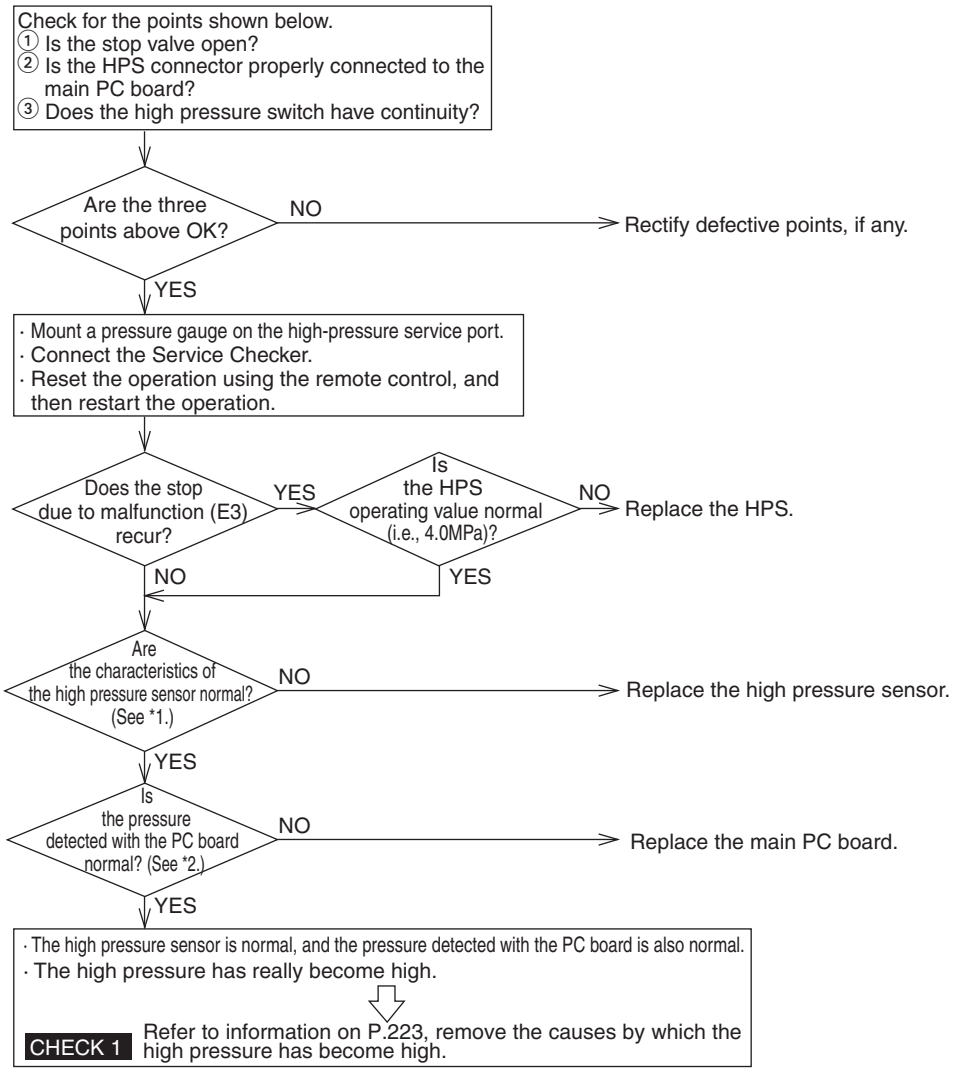
(V3064)

3.16 “E3” Outdoor Unit: Actuation of High Pressure Switch

Remote control Display	E3
Applicable Models	ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Abnormality is detected when the contact of the high pressure protection switch opens.
Malfunction Decision Conditions	Error is generated when the HPS activation count reaches the number specific to the operation mode. (Reference) Operating pressure of high pressure switch Operating pressure: 4.0MPa Reset pressure: 3.0MPa
Supposed Causes	■ Actuation of outdoor unit high pressure switch ■ Defect of High pressure switch ■ Defect of outdoor unit PC board (A1P) ■ Instantaneous power failure ■ Faulty high pressure sensor

Troubleshooting

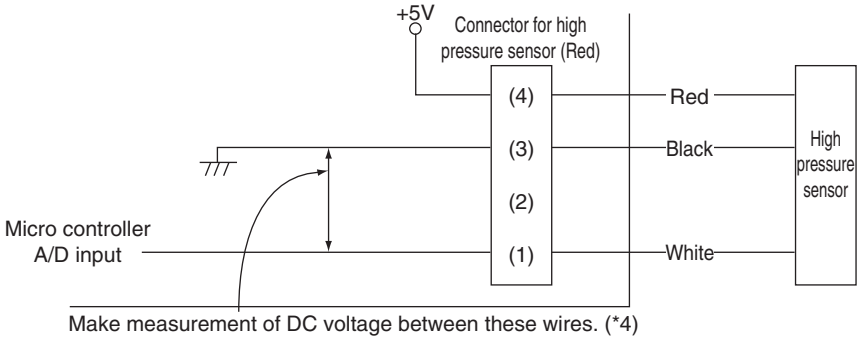
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Check for the points shown below.
① Is the stop valve open?
② Is the HPS connector properly connected to the main PC board?
③ Does the high pressure switch have continuity?
Are the three points above OK?
NO
Rectify defective points, if any.
YES
· Mount a pressure gauge on the high-pressure service port.
· Connect the Service Checker.
· Reset the operation using the remote control, and then restart the operation.
Does the stop due to malfunction (E3) recur?
YES
Is the HPS operating value normal (i.e., 4.0MPa)?
NO
Replace the HPS.
NO
YES
Are the characteristics of the high pressure sensor normal? (See *1.)
NO
Replace the high pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the main PC board.
YES
· The high pressure sensor is normal, and the pressure detected with the PC board is also normal.
· The high pressure has really become high.
CHECK 1
Refer to information on P.223, remove the causes by which the high pressure has become high.

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.
(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and then convert it to pressure according to information on “Pressure Sensor”.)

*2: Make a comparison between the high pressure value checked with the Service Checker and the voltage of the pressure sensor (see *1).

*3: Make measurement of voltage of the pressure sensor.

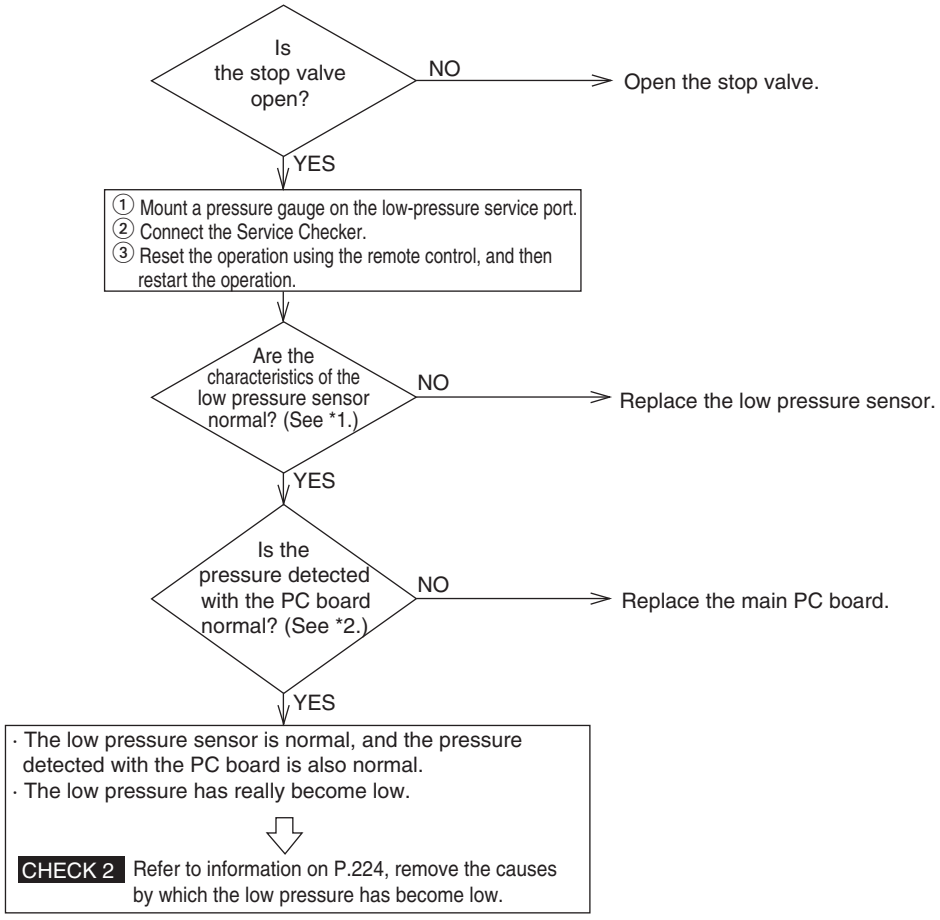


3.17 "E4" Outdoor Unit: Actuation of Low Pressure Sensor

Remote control Display	E4
Applicable Models	ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Abnormality is detected by the pressure value with the low pressure sensor.
Malfunction Decision Conditions	Error is generated when the low pressure is dropped under specific pressure. Operating pressure:0.07MPa
Supposed Causes	■ Abnormal drop of low pressure (Lower than 0.07MPa) ■ Defect of low pressure sensor ■ Defect of outdoor unit PC board (A1P) ■ Stop valve is not opened.

Troubleshooting

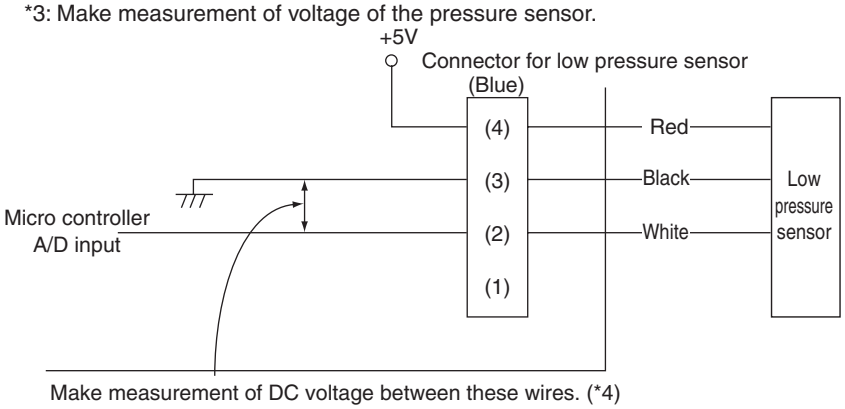
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the stop valve open?
NO
Open the stop valve.
YES
① Mount a pressure gauge on the low-pressure service port.
② Connect the Service Checker.
③ Reset the operation using the remote control, and then restart the operation.
Are the characteristics of the low pressure sensor normal? (See *1.)
NO
Replace the low pressure sensor.
YES
Is the pressure detected with the PC board normal? (See *2.)
NO
Replace the main PC board.
YES
· The low pressure sensor is normal, and the pressure detected with the PC board is also normal.
· The low pressure has really become low.
CHECK 2 Refer to information on P.224, remove the causes by which the low pressure has become low.

*1: Make a comparison between the voltage of the pressure sensor (*4) and that read by the pressure gauge.
(As to the voltage of the pressure sensor, make measurement of voltage at the connector, and then convert it to pressure according to information on “Pressure Sensor”.)

*2: Make a comparison between the low pressure value checked with the Service Checker and the voltage of the pressure sensor (see *1).

*3: Make measurement of voltage of the pressure sensor.



3.18 "E5" Inverter Compressor Motor Lock

Remote control Display

E5

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Inverter PC board takes the position signal from UVW line connected between the inverter and compressor, and the malfunction is detected when any abnormality is observed in the phase-current waveform.

Malfunction Decision Conditions

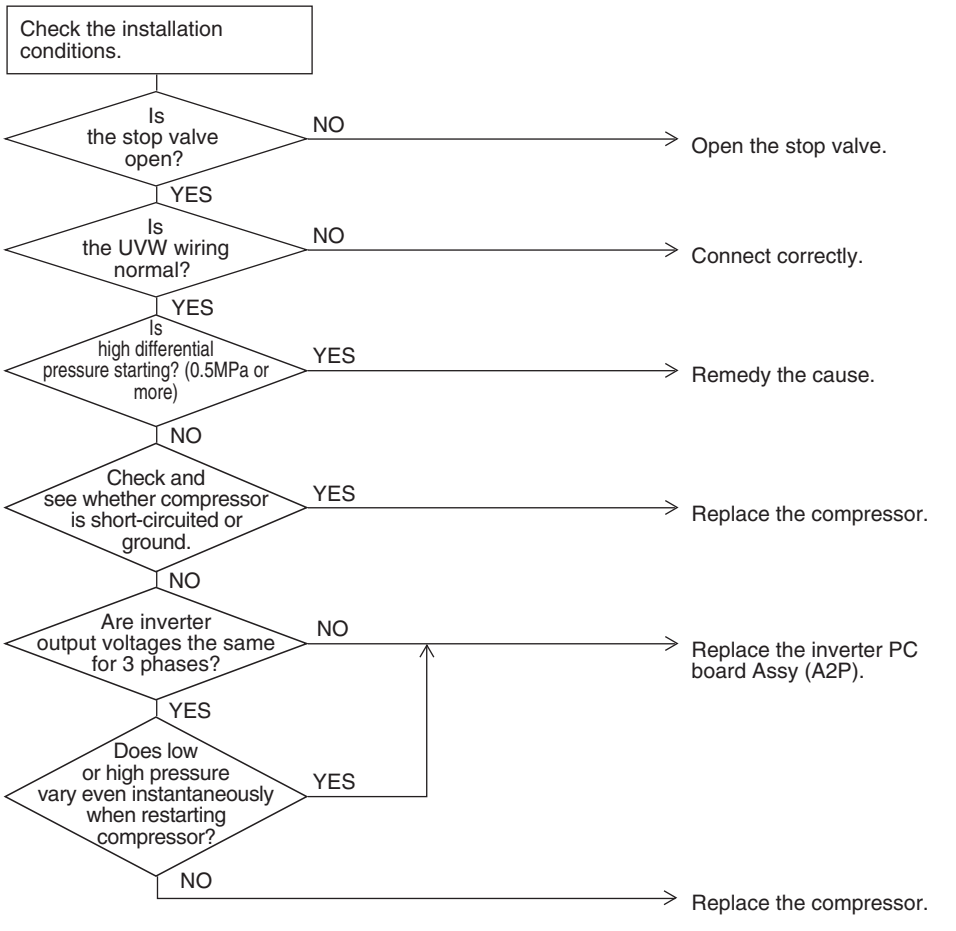
This malfunction will be output when the inverter compressor motor does not start up even in forced startup mode.

Supposed Causes

- Compressor lock
- High differential pressure (0.5MPa or more)
- Incorrect UVW wiring
- Faulty inverter PC board
- Stop valve is left in closed.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(V2793)

3.19 "E7" Malfunction of Outdoor Unit Fan Motor

Remote control Display

E7

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction of fan motor system is detected according to the fan speed detected by hall IC when the fan motor runs.

Malfunction Decision Conditions

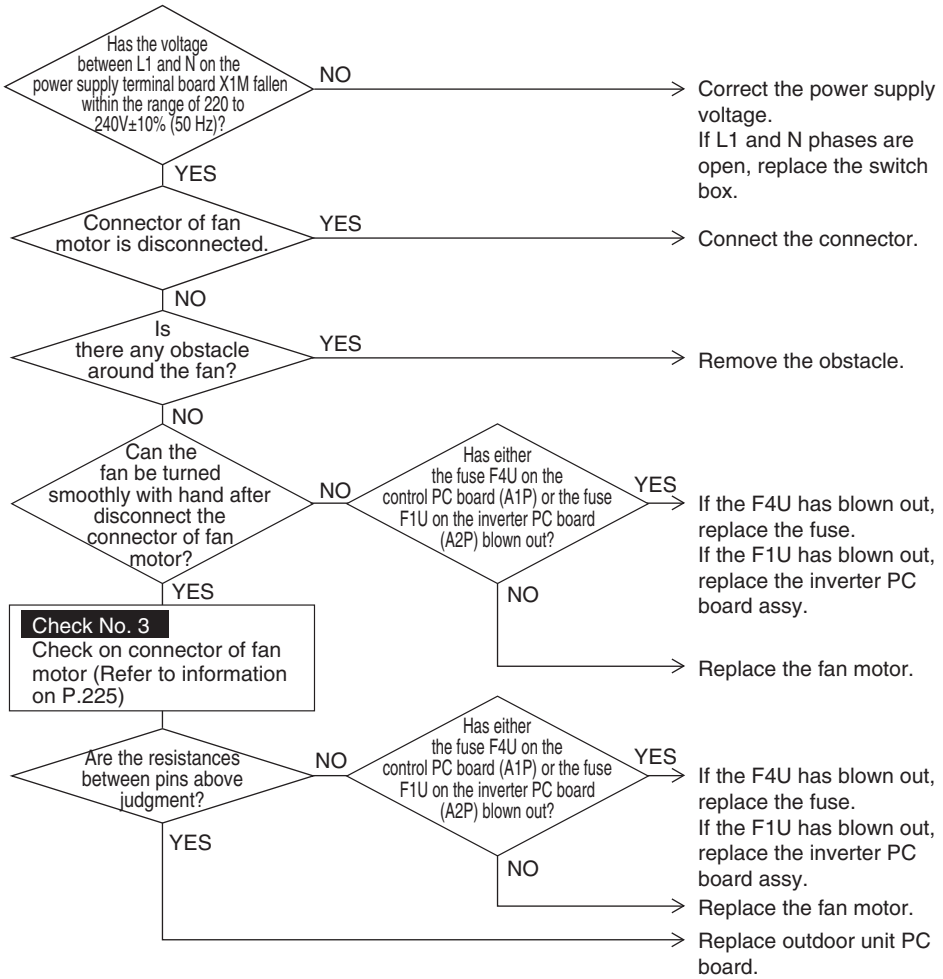
- When the fan runs with speed less than a specified one for 6 seconds or more when the fan motor running conditions are met
- When malfunction is generated 4 times, the system shuts down.

Supposed Causes

- Malfunction of fan motor
- The harness connector between fan motor and PC board is left in disconnected, or faulty connector
- Fan does not run due to foreign matters tangled
- Clearing condition: Operate for 5 minutes (normal)
- Open phase L1 or open phase N.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

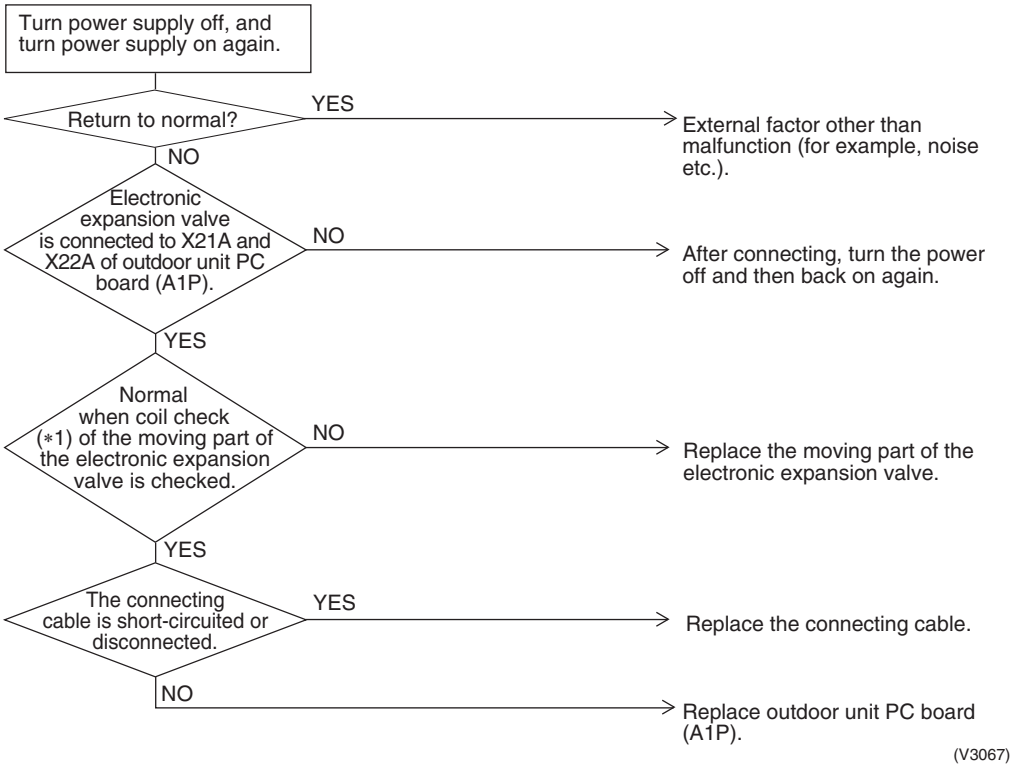

Has the voltage between L1 and N on the power supply terminal board X1M fallen within the range of 220 to 240V±10% (50 Hz)?
NO
Correct the power supply voltage.
If L1 and N phases are open, replace the switch box.
YES
Connector of fan motor is disconnected.
YES
Connect the connector.
NO
Is there any obstacle around the fan?
YES
Remove the obstacle.
NO
Can the fan be turned smoothly with hand after disconnect the connector of fan motor?
NO
Has either the fuse F4U on the control PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
If the F4U has blown out, replace the fuse.
If the F1U has blown out, replace the inverter PC board assy.
NO
Replace the fan motor.
YES
Check No. 3
Check on connector of fan motor (Refer to information on P.225)
Are the resistances between pins above judgment?
NO
Has either the fuse F4U on the control PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
If the F4U has blown out, replace the fuse.
If the F1U has blown out, replace the inverter PC board assy.
NO
Replace the fan motor.
YES
Replace outdoor unit PC board.

3.20 "E9" Outdoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (Y1E, Y3E)

Remote control Display	E9
Applicable Models	ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Check disconnection of connector Check continuity of expansion valve coil
Malfunction Decision Conditions	Error is generated under no common power supply when the power is on.
Supposed Causes	■ Defect of moving part of electronic expansion valve ■ Defect of outdoor unit PC board (A1P) ■ Defect of connecting cable

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Turn power supply off, and turn power supply on again.
Return to normal?
YES
External factor other than malfunction (for example, noise etc.).
NO
Electronic expansion valve is connected to X21A and X22A of outdoor unit PC board (A1P).
NO
After connecting, turn the power off and then back on again.
YES
Normal when coil check (*1) of the moving part of the electronic expansion valve is checked.
NO
Replace the moving part of the electronic expansion valve.
YES
The connecting cable is short-circuited or disconnected.
YES
Replace the connecting cable.
NO
Replace outdoor unit PC board (A1P).

(V3067)

*Make measurement of resistance between the connector pins, and then make sure the resistance falls in the range of 40 to 50Ω.

Measuring points
1 - 6
2 - 6
3 - 6
4 - 6

(V3067)

3.21 "F3" Outdoor Unit: Abnormal Discharge Pipe Temperature

Remote control Display

F3

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Abnormality is detected according to the temperature detected by the discharge pipe temperature sensor.

Malfunction Decision Conditions

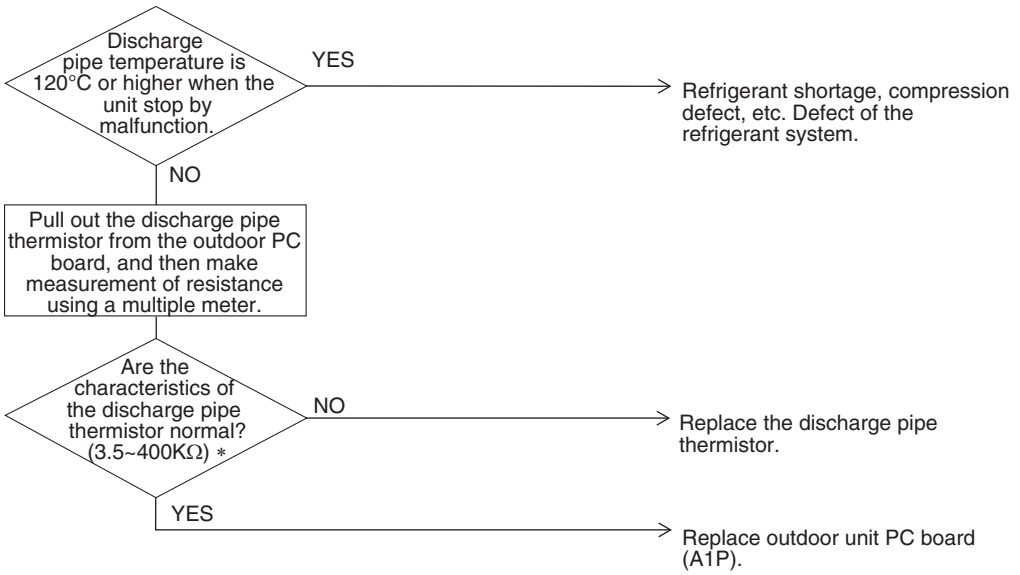
When the discharge pipe temperature rises to an abnormally high level
When the discharge pipe temperature rises suddenly

Supposed Causes

- Faulty discharge pipe temperature sensor
- Faulty connection of discharge pipe temperature sensor
- Faulty outdoor unit PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Discharge pipe temperature is 120°C or higher when the unit stop by malfunction.
YES
Refrigerant shortage, compression defect, etc. Defect of the refrigerant system.
NO
Pull out the discharge pipe thermistor from the outdoor PC board, and then make measurement of resistance using a multiple meter.
Are the characteristics of the discharge pipe thermistor normal? (3.5~400KΩ) *
NO
Replace the discharge pipe thermistor.
YES
Replace outdoor unit PC board (A1P).
(V3068)

* Refer to "Thermistor Resistance / Temperature Characteristics" table on P233.

3.22 "F6" Outdoor Unit: Refrigerant Overcharged

Remote control Display

F6

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Excessive charging of refrigerant is detected by using the heat exchanging deicer temperature during a check operation.

Malfunction Decision Conditions

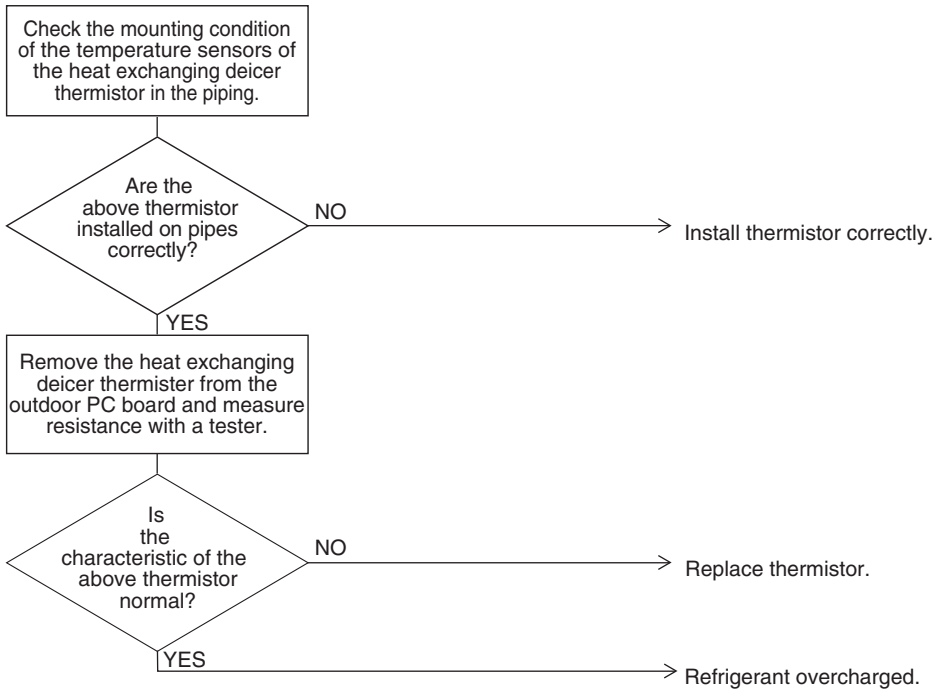
When the amount of refrigerant, which is calculated by using the heat exchanging deicer temperature during a check run, exceeds the standard.

Supposed Causes

- Refrigerant overcharge
- Misalignment of the thermistor for heat exchanger
- Defect of the thermistor for heat exchanger

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Check the mounting condition of the temperature sensors of the heat exchanging deicer thermistor in the piping.
Are the above thermistor installed on pipes correctly?
NO
Install thermistor correctly.
YES
Remove the heat exchanging deicer thermister from the outdoor PC board and measure resistance with a tester.
Is the characteristic of the above thermistor normal?
NO
Replace thermistor.
YES
Refrigerant overcharged.

(V2797)

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on P232.

3.23 "H9" Outdoor Unit: Malfunction of Thermistor (R1T) for Outdoor Air

Remote control Display

H9

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the outdoor air thermistor.

Malfunction Decision Conditions

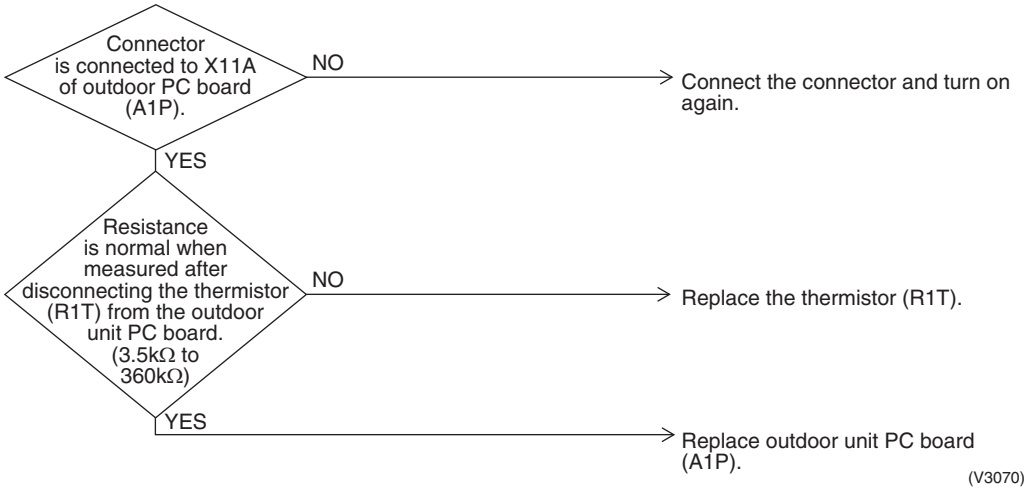
When the outside air temperature thermistor has short circuit or open circuit.

Supposed Causes

- Defect of thermistor (R1T) for outdoor air
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X11A of outdoor PC board (A1P).
NO
Connect the connector and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R1T) from the outdoor unit PC board. (3.5kΩ to 360kΩ)
NO
Replace the thermistor (R1T).
YES
Replace outdoor unit PC board (A1P).
(V3070)

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on P232.

3.24 "J3" Outdoor Unit: Malfunction of Discharge Pipe Thermistor (R2T)

Remote control Display

J3

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the temperature detected by discharge pipe temperature thermistor.

Malfunction Decision Conditions

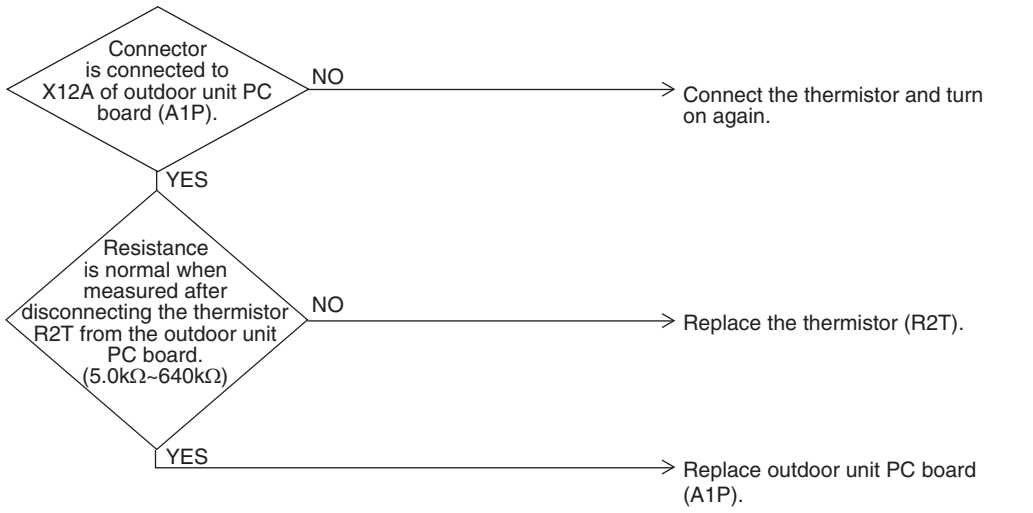
When a short circuit or an open circuit in the discharge pipe temperature thermistor is detected.

Supposed Causes

- Defect of thermistor (R2T) for outdoor unit discharge pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X12A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor R2T from the outdoor unit PC board. (5.0kΩ~640kΩ)
NO
Replace the thermistor (R2T).
YES
Replace outdoor unit PC board (A1P).
(V3072)

∗ Refer to thermistor resistance / temperature characteristics table on P233.

3.25 "J5" Outdoor Unit: Malfunction of Thermistor (R3T, R5T) for Suction Pipe 1, 2

Remote control Display

J5

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the thermistor for suction pipe 1, 2.

Malfunction Decision Conditions

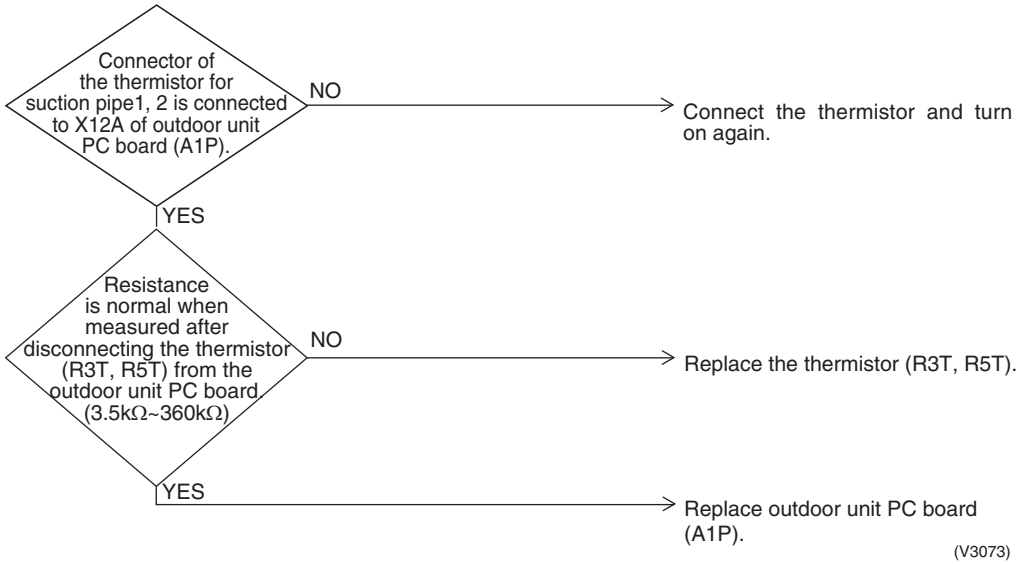
When a short circuit or an open circuit in the thermistor for suction pipe 1, 2 are detected.

Supposed Causes

- Defect of thermistor (R3T, R5T) for outdoor unit suction pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector of the thermistor for suction pipe1, 2 is connected to X12A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R3T, R5T) from the outdoor unit PC board (3.5kΩ~360kΩ)
NO
Replace the thermistor (R3T, R5T).
YES
Replace outdoor unit PC board (A1P).
(V3073)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.26 "J6" Outdoor Unit: Malfunction of Thermistor (R6T)

Remote control Display

J6

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the heat exchanger thermistor.

Malfunction Decision Conditions

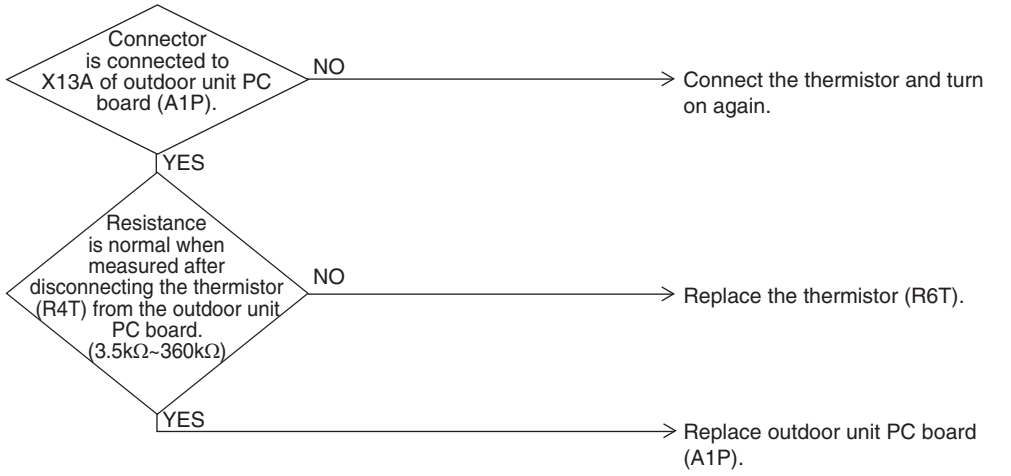
When a short circuit or an open circuit in the heat exchange thermistor is detected.

Supposed Causes

- Defect of thermistor (R6T) for outdoor unit heat exchanger
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X13A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R4T) from the outdoor unit PC board. (3.5kΩ~360kΩ)
NO
Replace the thermistor (R6T).
YES
Replace outdoor unit PC board (A1P).

(V3074)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.27 "J7" Outdoor Unit: Malfunction of Thermistor (R7T) for Outdoor Unit Liquid Pipe

Remote control Display

J7

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the temperature detected by the liquid pipe thermistor.

Malfunction Decision Conditions

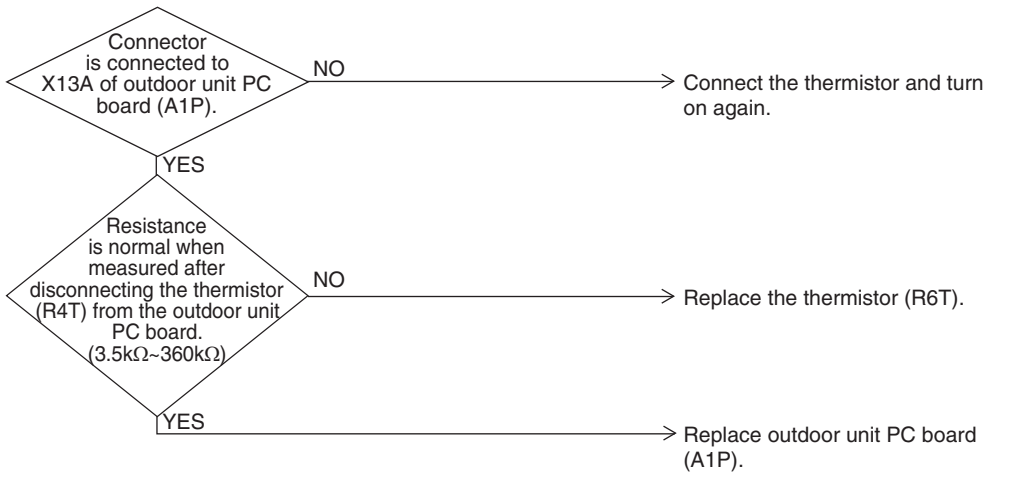
When a short circuit or an open circuit in the heat exchange thermistor is detected.

Supposed Causes

- Defect of thermistor (R7T) for outdoor unit liquid pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Connector is connected to X13A of outdoor unit PC board (A1P).
NO
Connect the thermistor and turn on again.
YES
Resistance is normal when measured after disconnecting the thermistor (R4T) from the outdoor unit PC board. (3.5kΩ~360kΩ)
NO
Replace the thermistor (R6T).
YES
Replace outdoor unit PC board (A1P).

(V3074)

∗ Refer to thermistor resistance / temperature characteristics table on P232.

3.28 "J9" Outdoor Unit: Malfunction of Thermistor (R4T)

Remote control Display

J9

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected according to the temperature detected by subcooling heat exchanger gas pipe thermistor.

Malfunction Decision Conditions

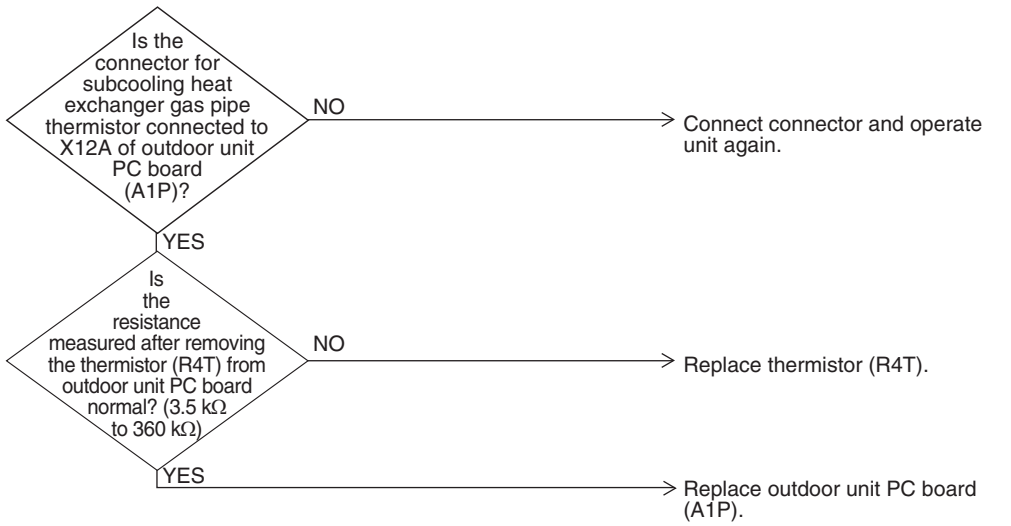
When the subcooling heat exchanger gas pipe thermistor is short circuited or open.

Supposed Causes

- Faulty subcooling heat exchanger gas pipe thermistor (R4T)
- Faulty outdoor unit PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the connector for subcooling heat exchanger gas pipe thermistor connected to X12A of outdoor unit PC board (A1P)?
NO
Connect connector and operate unit again.
YES
Is the resistance measured after removing the thermistor (R4T) from outdoor unit PC board normal? (3.5 kΩ to 360 kΩ)
NO
Replace thermistor (R4T).
YES
Replace outdoor unit PC board (A1P).
(V3075)

∗ Refer to "Thermistor Resistance / Temperature Characteristics" table on P232.

3.29 "JA" Outdoor Unit: Malfunction of High Pressure Sensor

remote control Display

JA

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from the pressure detected by the high pressure sensor.

Malfunction Decision Conditions

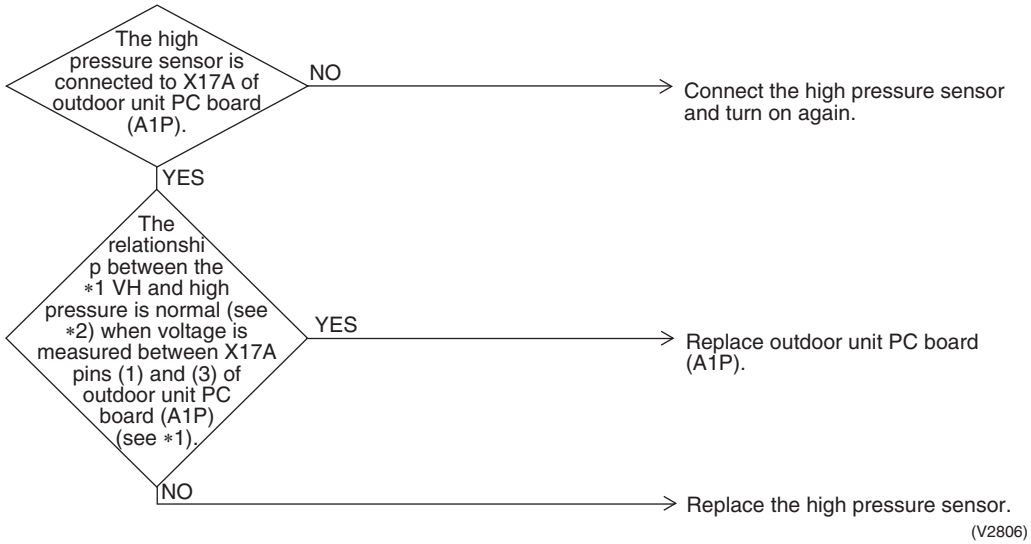
When the high pressure sensor is short circuit or open circuit.

Supposed Causes

- Defect of high pressure sensor
- Connection of low pressure sensor with wrong connection.
- Defect of outdoor unit PC board.

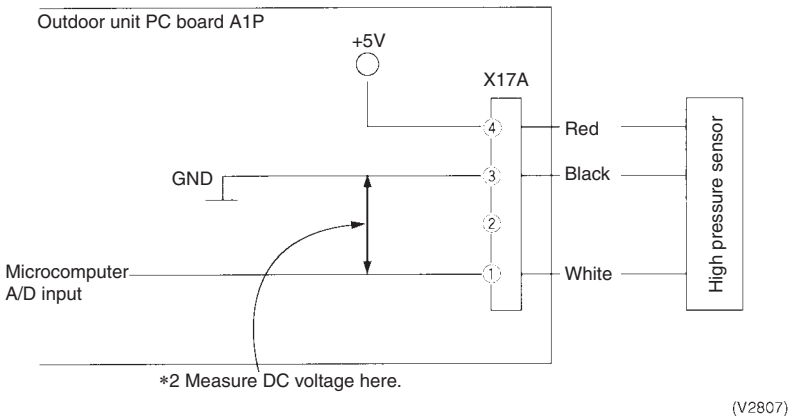
Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The high pressure sensor is connected to X17A of outdoor unit PC board (A1P).
NO
Connect the high pressure sensor and turn on again.
YES
The relationship between the ∗1 VH and high pressure is normal (see ∗2) when voltage is measured between X17A pins (1) and (3) of outdoor unit PC board (A1P) (see ∗1).
YES
Replace outdoor unit PC board (A1P).
NO
Replace the high pressure sensor.

(V2806)

∗1: Voltage measurement point



(V2807)

∗2: Refer to "Pressure Sensor", pressure / voltage characteristics table on P234.

3.30 "JC" Outdoor Unit: Malfunction of Low Pressure Sensor

Remote control Display

JC

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from pressure detected by low pressure sensor.

Malfunction Decision Conditions

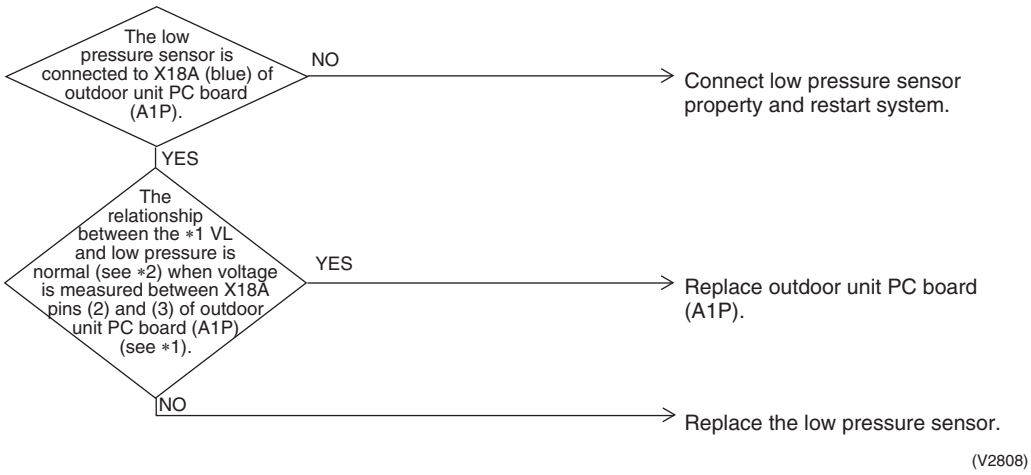
When the low pressure sensor is short circuit or open circuit.

Supposed Causes

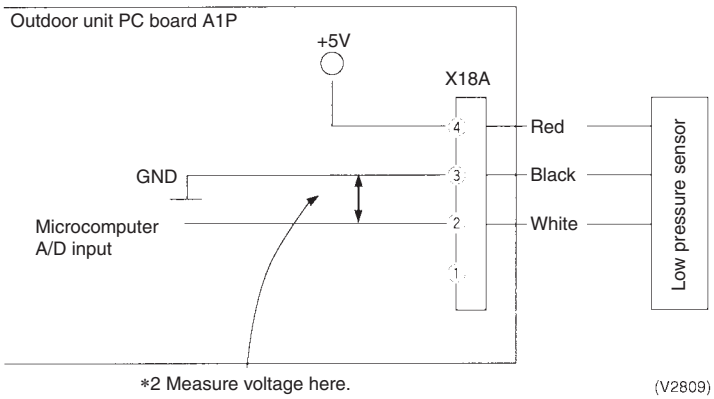
- Defect of low pressure sensor
- Connection of high pressure sensor with wrong connection.
- Defect of outdoor unit PC board.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The low pressure sensor is connected to X18A (blue) of outdoor unit PC board (A1P).
NO
Connect low pressure sensor property and restart system.
YES
The relationship between the ∗1 VL and low pressure is normal (see ∗2) when voltage is measured between X18A pins (2) and (3) of outdoor unit PC board (A1P) (see ∗1).
YES
Replace outdoor unit PC board (A1P).
NO
Replace the low pressure sensor.
(V2808)

∗1: Voltage measurement point



∗2: Refer to "Pressure Sensor", pressure/voltage characteristics table on P234.

3.31 "L1" Outdoor Unit: Malfunction of PC Board

Remote control Display

L1

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

- Detect malfunctions by current value during waveform output before compressor startup.
- Detect malfunctions by current sensor value during synchronized operation at the time of startup.

Malfunction Decision Conditions

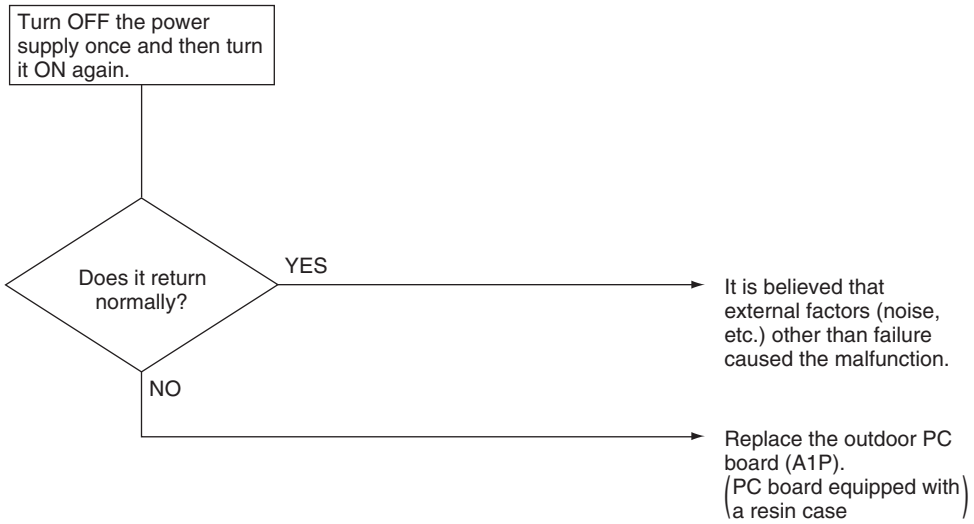
- In case of overcurrent (OCP) during waveform output
- When the current sensor malfunctions during synchronized operation
- In case of IGBT malfunction

Supposed Causes

- Faulty outdoor PC board (A1P)
  - IPM failure
  - Current sensor failure
  - Failure of IGBT or drive circuit

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Turn OFF the power supply once and then turn it ON again.
Does it return normally?
YES
It is believed that external factors (noise, etc.) other than failure caused the malfunction.
NO
Replace the outdoor PC board (A1P).
(PC board equipped with a resin case)

3.32 "L4" Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise

Remote control Display

L4

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Fin temperature is detected by the thermistor of the radiation fin.

Malfunction Decision Conditions

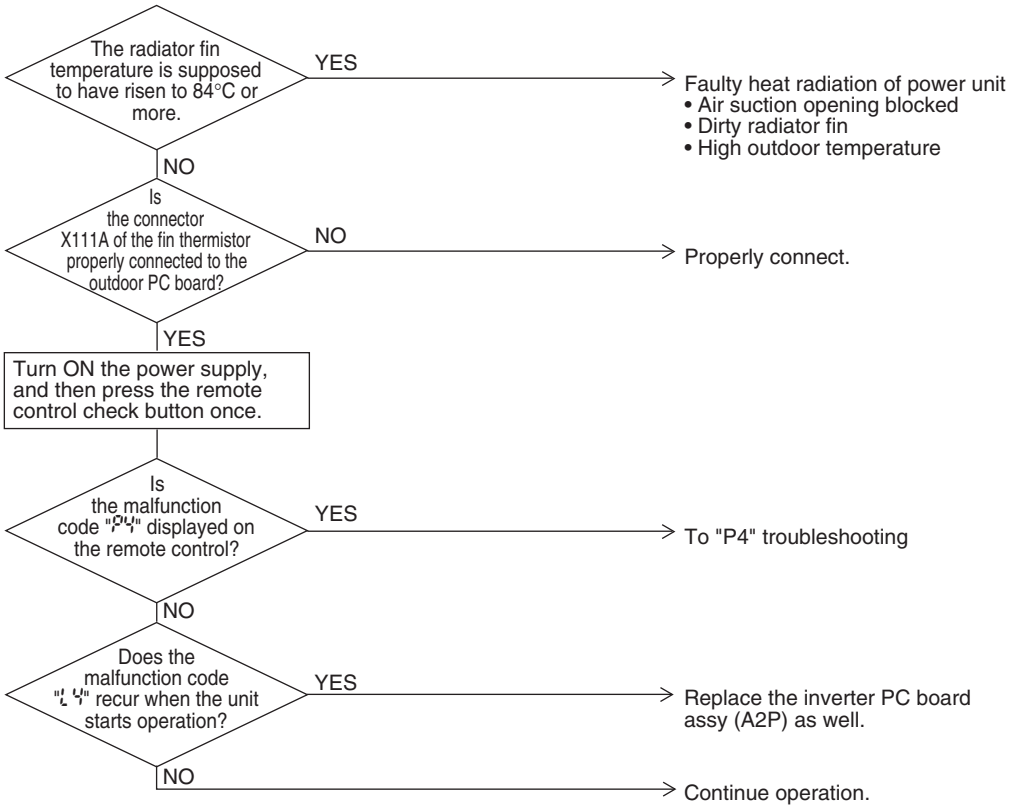
When the temperature of the inverter radiation fin increases above 83°C.

Supposed Causes

- Actuation of fin thermal (Actuates above 83°C)
- Defect of inverter PC board (A2P)
- Defect of fin thermistor

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


The radiator fin temperature is supposed to have risen to 84°C or more.
YES
Faulty heat radiation of power unit
• Air suction opening blocked
• Dirty radiator fin
• High outdoor temperature
NO
Is the connector X111A of the fin thermistor properly connected to the outdoor PC board?
NO
Properly connect.
YES
Turn ON the power supply, and then press the remote control check button once.
Is the malfunction code "P4" displayed on the remote control?
YES
To "P4" troubleshooting
NO
Does the malfunction code "L4" recur when the unit starts operation?
YES
Replace the inverter PC board assy (A2P) as well.
NO
Continue operation.

3.33 "L5" Outdoor Unit: Inverter Compressor Abnormal

Remote control Display

L5

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from current flowing in the power transistor.

Malfunction Decision Conditions

When an excessive current flows in the power transistor.
(Instantaneous overcurrent also causes activation.)

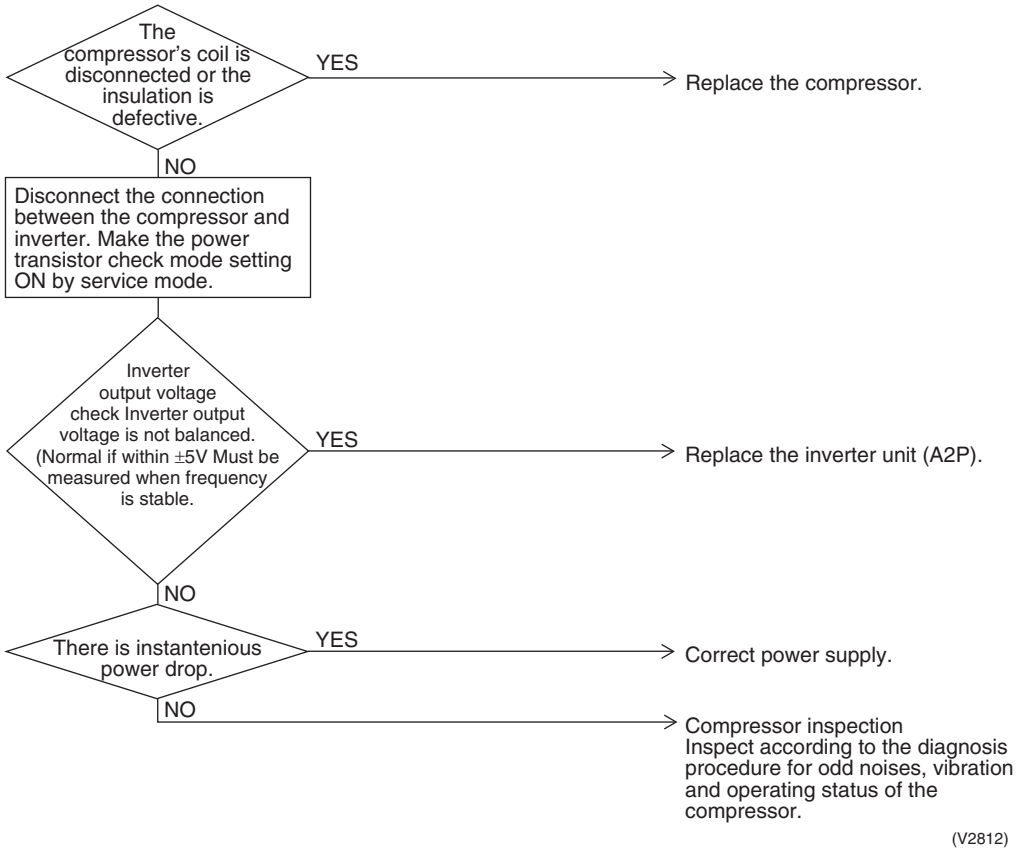
Supposed Causes

- Defect of compressor coil (disconnected, defective insulation)
- Compressor start-up malfunction (mechanical lock)
- Defect of inverter PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Compressor inspection


The compressor's coil is disconnected or the insulation is defective.
YES
Replace the compressor.
NO
Disconnect the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within ±5V Must be measured when frequency is stable.
YES
Replace the inverter unit (A2P).
NO
There is instantenious power drop.
YES
Correct power supply.
NO
Compressor inspection
Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.
(V2812)

Higher voltage than actual is displayed when the inverter output voltage is checked by tester.

3.34 "L8" Outdoor Unit: Inverter Current Abnormal

Remote control Display

L8

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected by current flowing in the power transistor.

Malfunction Decision Conditions

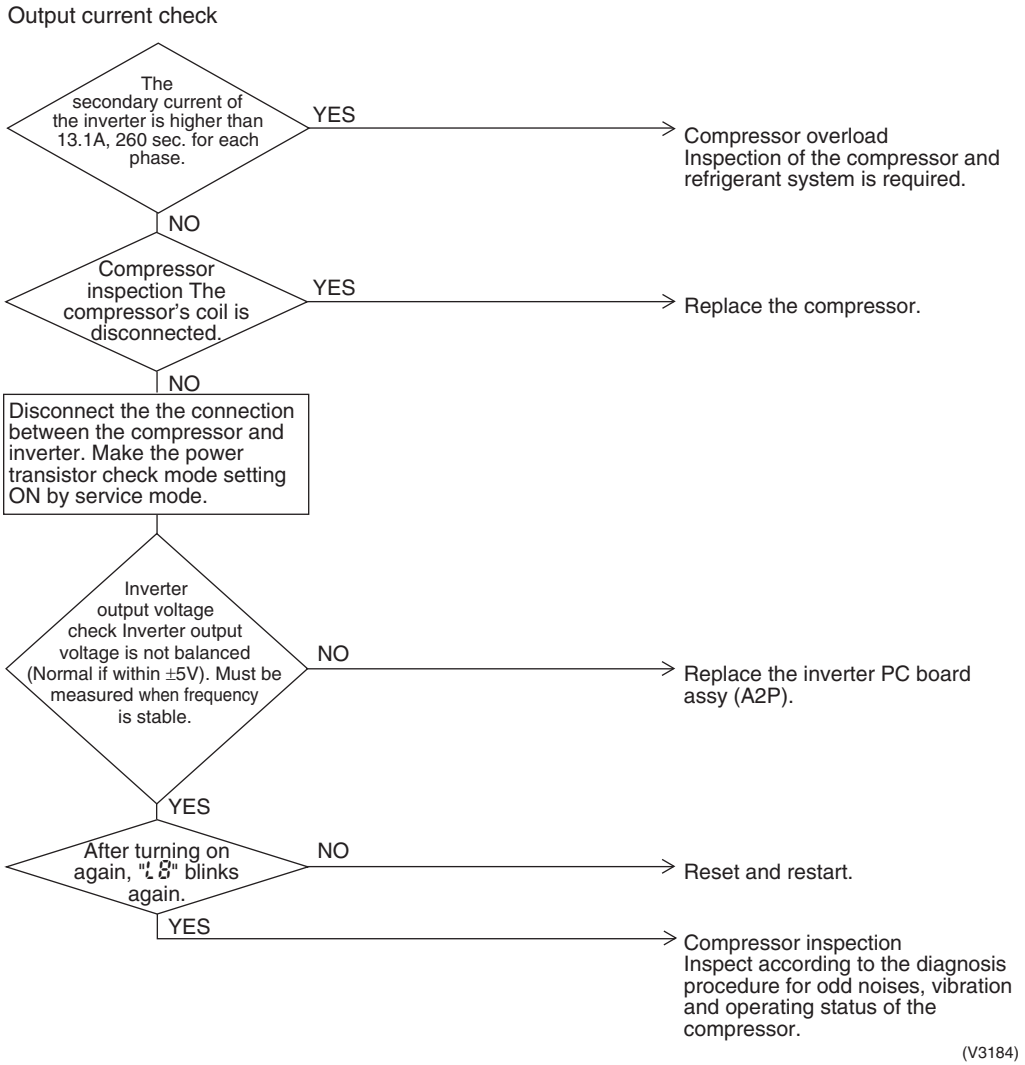
When overload in the compressor is detected.

Supposed Causes

- Compressor overload
- Compressor coil disconnected
- Defect of outdoor unit PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Output current check
The secondary current of the inverter is higher than 13.1A, 260 sec. for each phase.
YES
Compressor overload
Inspection of the compressor and refrigerant system is required.
NO
Compressor inspection The compressor's coil is disconnected.
YES
Replace the compressor.
NO
Disconnect the the connection between the compressor and inverter. Make the power transistor check mode setting ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced (Normal if within ±5V). Must be measured when frequency is stable.
NO
Replace the inverter PC board assy (A2P).
YES
After turning on again, "L8" blinks again.
NO
Reset and restart.
YES
Compressor inspection
Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.
(V3184)

3.35 "L9" Outdoor Unit: Inverter Start up Error

Remote control Display

L9

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected from current flowing in the power transistor.

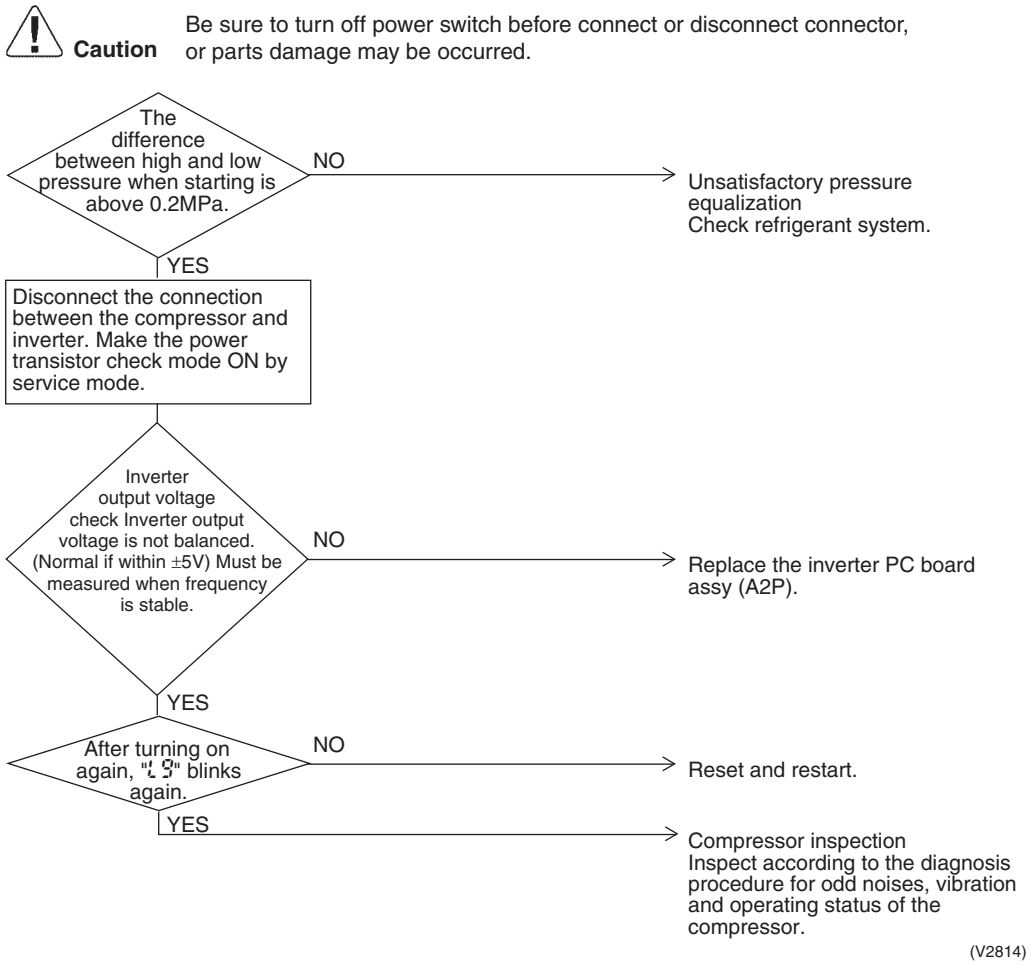
Malfunction Decision Conditions

When overload in the compressor is detected during startup

Supposed Causes

- Defect of compressor
- Pressure differential start
- Defect of outdoor unit PC board (A2P)

Troubleshooting


Caution
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.
The difference between high and low pressure when starting is above 0.2MPa.
NO
Unsatisfactory pressure equalization
Check refrigerant system.
YES
Disconnect the connection between the compressor and inverter. Make the power transistor check mode ON by service mode.
Inverter output voltage check Inverter output voltage is not balanced. (Normal if within ±5V) Must be measured when frequency is stable.
NO
Replace the inverter PC board assy (A2P).
YES
After turning on again, "L9" blinks again.
NO
Reset and restart.
YES
Compressor inspection
Inspect according to the diagnosis procedure for odd noises, vibration and operating status of the compressor.
(V2814)

3.36 "LC" Outdoor Unit: Malfunction of Transmission between Inverter and Control PC Board

Remote control Display

LC

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Check the communication state between inverter PC board and control PC board by micro-computer.

Malfunction Decision Conditions

When the correct communication is not conducted in certain period.

Supposed Causes

- Malfunction of connection between the inverter microcomputer and outdoor control microcomputer
- Defect of outdoor unit PC board (A1P)
- External factor (Noise etc.)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

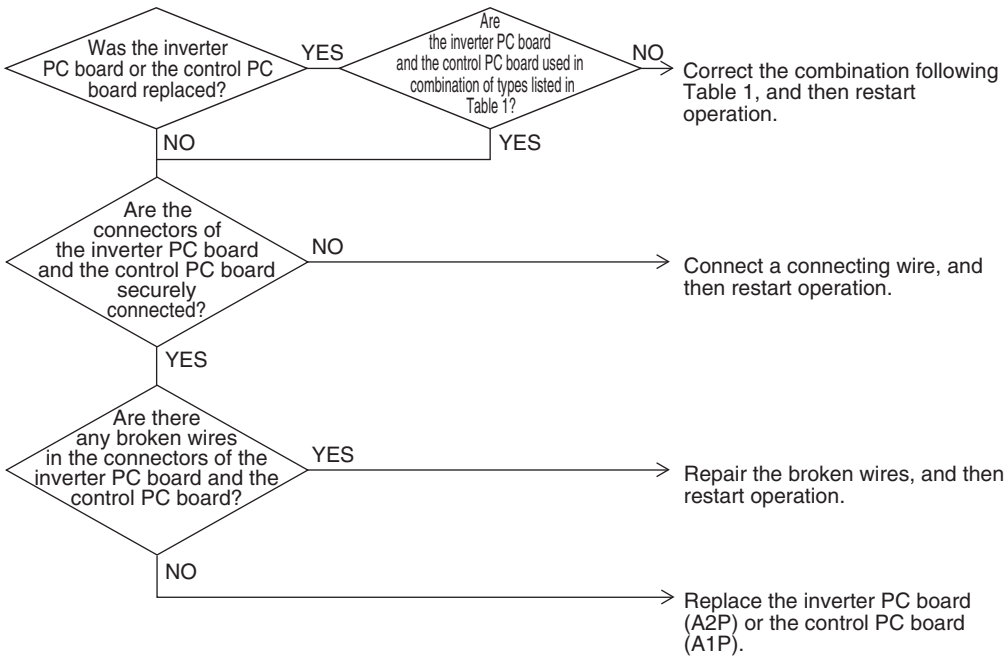

Was the inverter PC board or the control PC board replaced?
YES
Are the inverter PC board and the control PC board used in combination of types listed in Table 1?
NO
Correct the combination following Table 1, and then restart operation.
NO
YES
Are the connectors of the inverter PC board and the control PC board securely connected?
NO
Connect a connecting wire, and then restart operation.
YES
Are there any broken wires in the connectors of the inverter PC board and the control PC board?
YES
Repair the broken wires, and then restart operation.
NO
Replace the inverter PC board (A2P) or the control PC board (A1P).

Table 1: Combination of PC boards

	Type of control PC board	Type of inverter PC board
RXYSQ4PA7Y1B RXYSQ5PA7Y1B RXYSQ6PA7Y1B	EC0640-1	PC0625-1

3.37 "P1" Outdoor Unit: High Voltage of Capacitor in Main Inverter Circuit

Remote control Display

P1

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Malfunction is detected according to the voltage waveform of main circuit capacitor built in the inverter.

Malfunction Decision Conditions

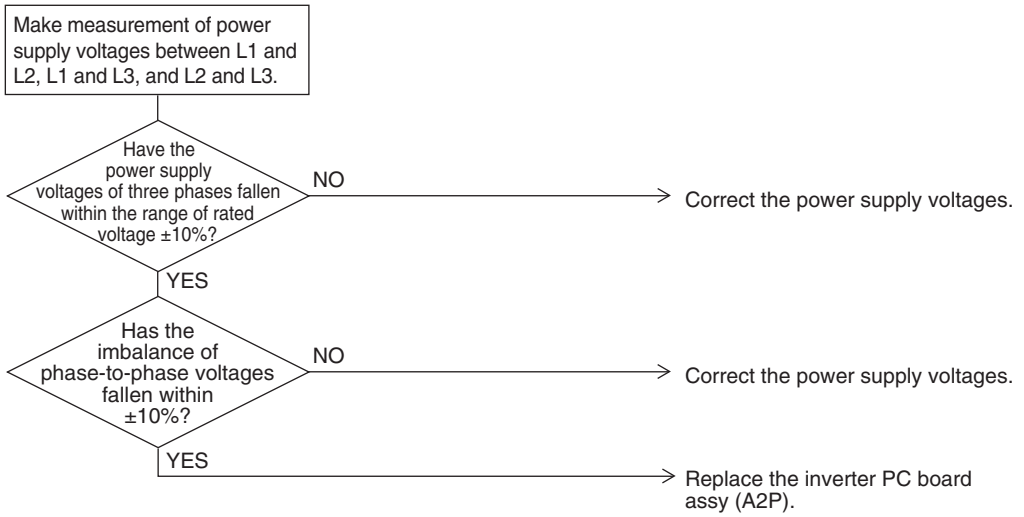
When the aforementioned voltage waveform becomes identical with the waveform of the power supply open phase.

Supposed Causes

- Defect of main circuit capacitor
- Improper main circuit wiring
- Defect of outdoor unit PC board (A2P)
- Imbalance of phase-to-phase voltages
- Open phase

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

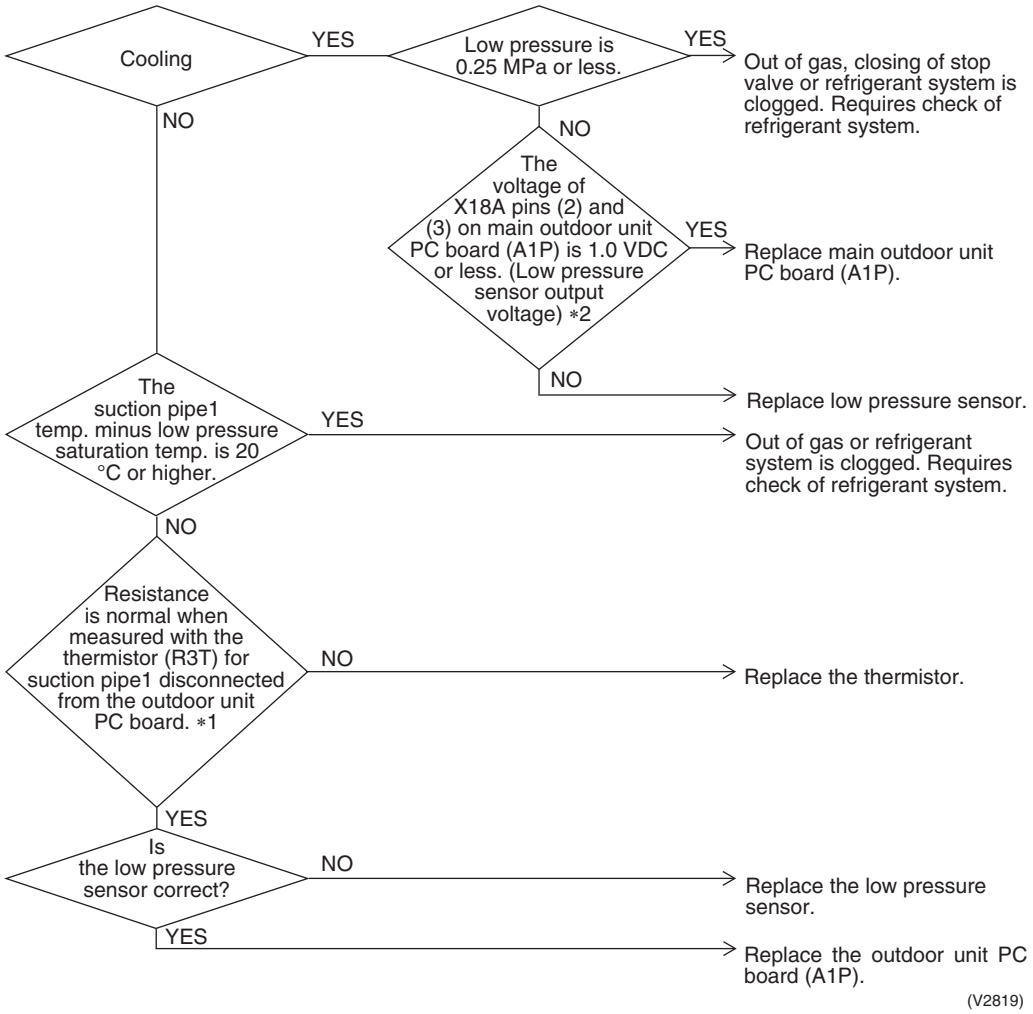

Make measurement of power supply voltages between L1 and L2, L1 and L3, and L2 and L3.
Have the power supply voltages of three phases fallen within the range of rated voltage ±10%?
NO
Correct the power supply voltages.
YES
Has the imbalance of phase-to-phase voltages fallen within ±10%?
NO
Correct the power supply voltages.
YES
Replace the inverter PC board assy (A2P).

3.38 "U0" Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure

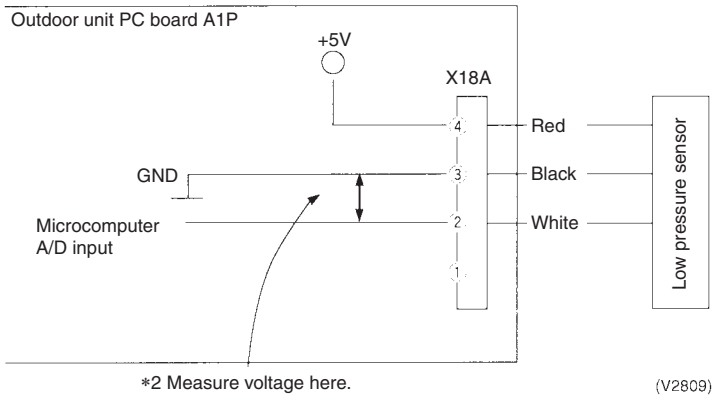
Remote control Display	U0
Applicable Models	ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Short of gas malfunction is detected by discharge pipe temperature thermistor and low pressure saturation temperature.
Malfunction Decision Conditions	Microcomputer judge and detect if the system is short of refrigerant. ★Malfunction is not decided while the unit operation is continued.
Supposed Causes	■ Out of gas or refrigerant system clogging (incorrect piping) ■ Defect of pressure sensor ■ Defect of outdoor unit PC board (A1P) ■ Defect of thermistor R3T

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Cooling
YES
Low pressure is 0.25 MPa or less.
YES
Out of gas, closing of stop valve or refrigerant system is clogged. Requires check of refrigerant system.
NO
NO
The voltage of X18A pins (2) and (3) on main outdoor unit PC board (A1P) is 1.0 VDC or less. (Low pressure sensor output voltage) ∗2
YES
Replace main outdoor unit PC board (A1P).
NO
Replace low pressure sensor.
The suction pipe1 temp. minus low pressure saturation temp. is 20 °C or higher.
YES
Out of gas or refrigerant system is clogged. Requires check of refrigerant system.
NO
Resistance is normal when measured with the thermistor (R3T) for suction pipe1 disconnected from the outdoor unit PC board. ∗1
NO
Replace the thermistor.
YES
Is the low pressure sensor correct?
NO
Replace the low pressure sensor.
YES
Replace the outdoor unit PC board (A1P).
(V2819)

∗2: Voltage measurement point



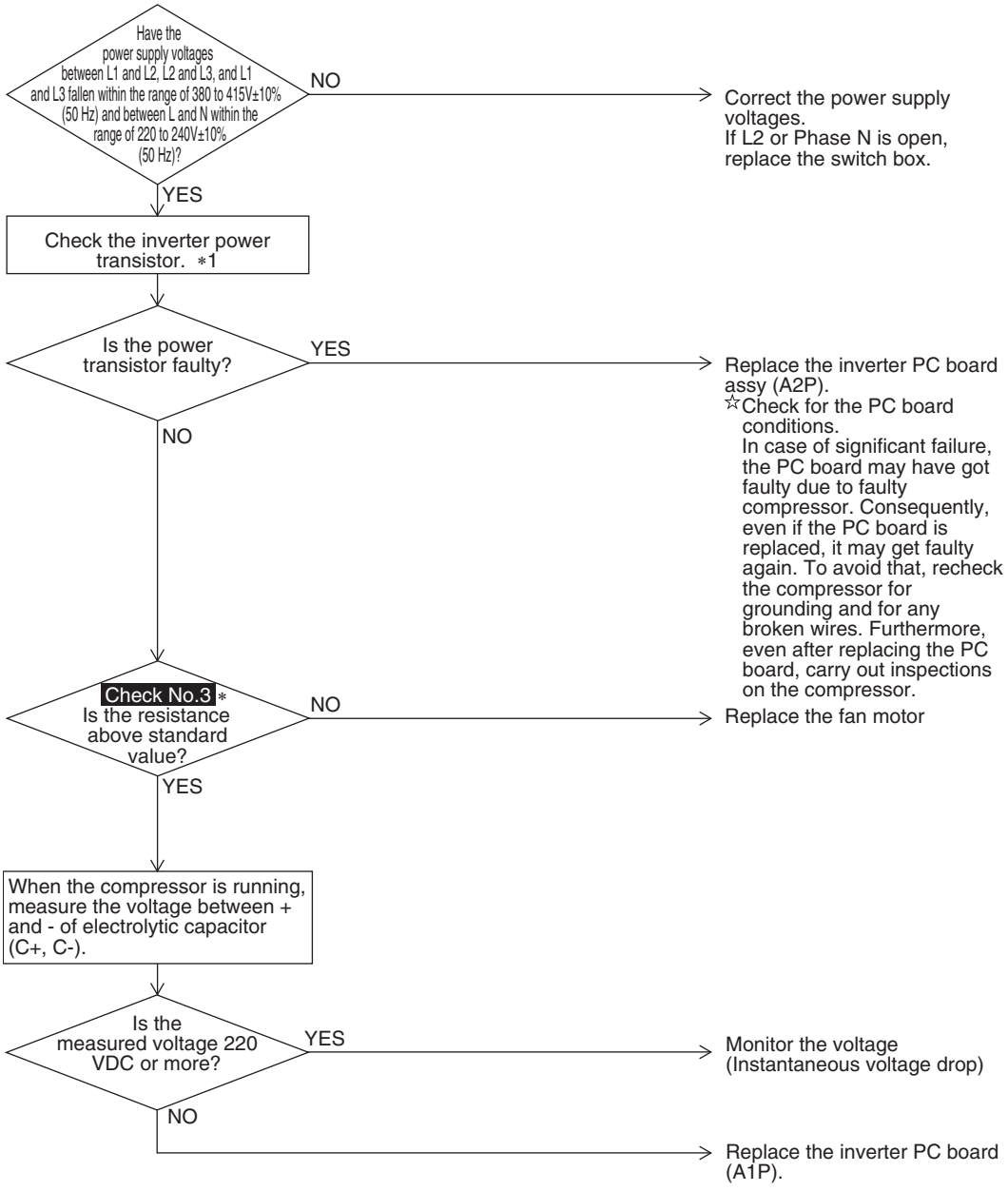
∗1: Refer to “Thermistor Resistance / Temperature Characteristics” table on P232.
∗2: Refer to “Pressure Sensor, Pressure / Voltage Characteristics” table on P234.

3.39 "U2" Power Supply Insufficient or Instantaneous Failure

Remote control Display	U2
Applicable Models	ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Detection of voltage of main circuit capacitor built in the inverter and power supply voltage.
Malfunction Decision Conditions	When the abnormal voltage of main circuit capacitor built in the inverter and abnormal power supply voltage are detected.
Supposed Causes	■ Power supply insufficient ■ Instantaneous power failure ■ Defect of outdoor unit fan motor ■ Defect of outdoor inverter PC board (A2P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Have the power supply voltages between L1 and L2, L2 and L3, and L1 and L3 fallen within the range of 380 to 415V±10% (50 Hz) and between L and N within the range of 220 to 240V±10% (50 Hz)?
NO
Correct the power supply voltages.
If L2 or Phase N is open, replace the switch box.
YES
Check the inverter power transistor. ∗1
Is the power transistor faulty?
YES
Replace the inverter PC board assy (A2P).
☆Check for the PC board conditions.
In case of significant failure, the PC board may have got faulty due to faulty compressor. Consequently, even if the PC board is replaced, it may get faulty again. To avoid that, recheck the compressor for grounding and for any broken wires. Furthermore, even after replacing the PC board, carry out inspections on the compressor.
NO
Check No.3 ∗
Is the resistance above standard value?
NO
Replace the fan motor
YES
When the compressor is running, measure the voltage between + and - of electrolytic capacitor (C+, C-).
Is the measured voltage 220 VDC or more?
YES
Monitor the voltage (Instantaneous voltage drop)
NO
Replace the inverter PC board (A1P).

(S2605)

∗1: Inverter's Power Transistors Check : Refer to information on P.235~236.
∗Check No.3 : Refer to information on P.226.

3.40 "U3" Check Operation not Executed

Remote control Display

U3

Applicable Models

ERQ 125 ~ 200 A7V1

Method of Malfunction Detection

Check operation is executed or not

Malfunction Decision Conditions

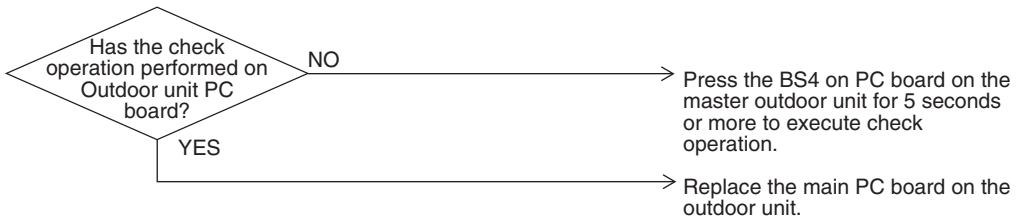
Malfunction is decided when the unit starts operation without check operation.

Supposed Causes

- Check operation is not executed.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Has the check operation performed on Outdoor unit PC board?
NO
YES
Press the BS4 on PC board on the master outdoor unit for 5 seconds or more to execute check operation.
Replace the main PC board on the outdoor unit.

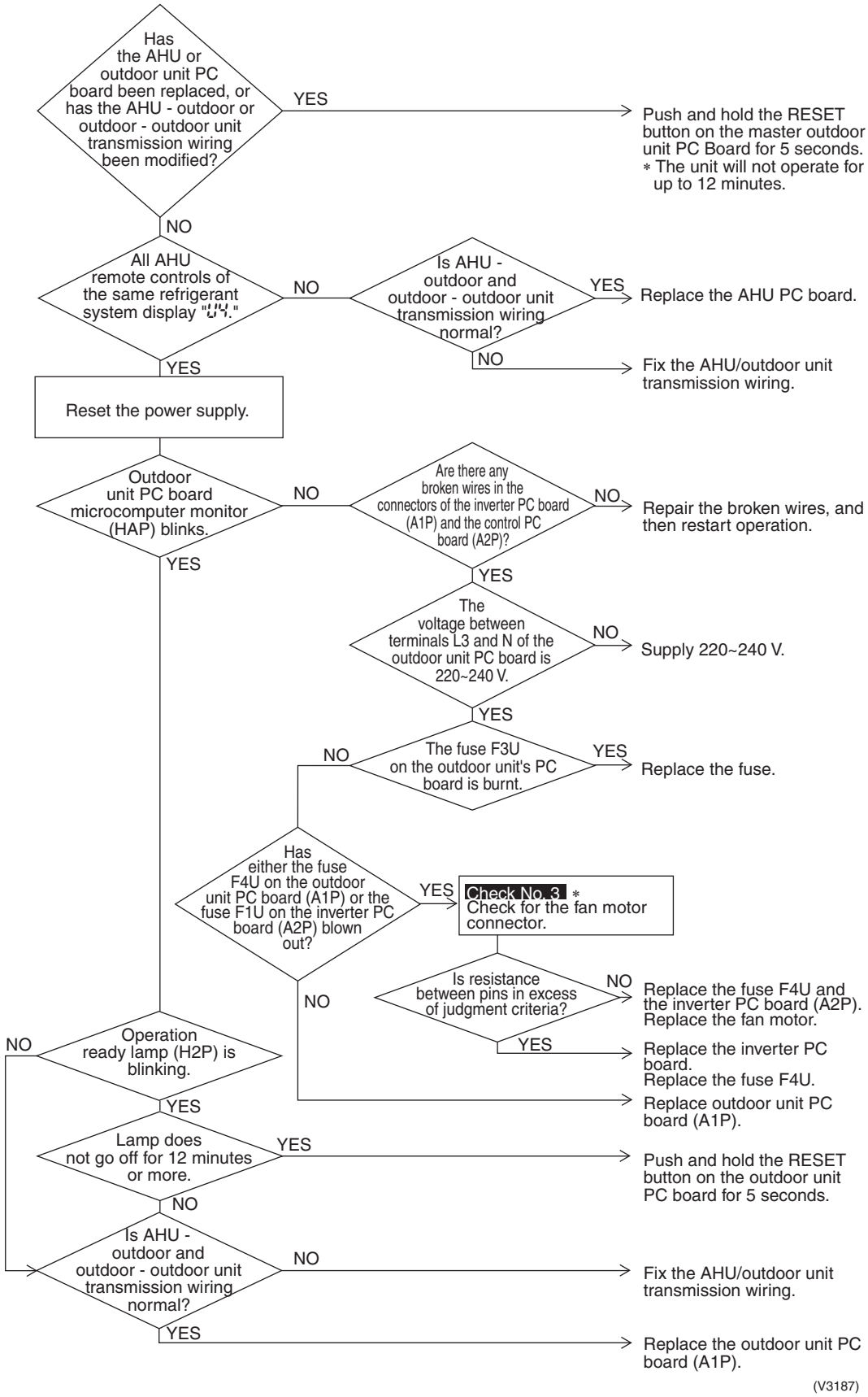
(V3052)

3.41 “U4” Malfunction of Transmission between AHUs and Outdoor Units

Remote control Display	U4
Applicable Models	AII AHU models ERQ 125 ~ 200 A7V1
Method of Malfunction Detection	Microcomputer checks if transmission between AHUs and outdoor units is normal.
Malfunction Decision Conditions	When transmission is not carried out normally for a certain amount of time
Supposed Causes	■ Indoor to outdoor, outdoor to outdoor transmission wiring F1, F2 disconnection, short circuit or wrong wiring ■ Outdoor unit power supply is OFF ■ System address doesn’t match ■ Defect of outdoor unit PC board ■ Defect of AHU PC board

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Has the AHU or outdoor unit PC board been replaced, or has the AHU - outdoor or outdoor - outdoor unit transmission wiring been modified?
YES
Push and hold the RESET button on the master outdoor unit PC Board for 5 seconds.
* The unit will not operate for up to 12 minutes.
NO
All AHU remote controls of the same refrigerant system display "UY."
NO
Is AHU - outdoor and outdoor - outdoor unit transmission wiring normal?
YES
Replace the AHU PC board.
NO
Fix the AHU/outdoor unit transmission wiring.
YES
Reset the power supply.
Outdoor unit PC board microcomputer monitor (HAP) blinks.
NO
Are there any broken wires in the connectors of the inverter PC board (A1P) and the control PC board (A2P)?
NO
Repair the broken wires, and then restart operation.
YES
YES
The voltage between terminals L3 and N of the outdoor unit PC board is 220~240 V.
NO
Supply 220~240 V.
YES
NO
The fuse F3U on the outdoor unit's PC board is burnt.
YES
Replace the fuse.
Has either the fuse F4U on the outdoor unit PC board (A1P) or the fuse F1U on the inverter PC board (A2P) blown out?
YES
Check No.3 *
Check for the fan motor connector.
Is resistance between pins in excess of judgment criteria?
NO
Replace the fuse F4U and the inverter PC board (A2P).
Replace the fan motor.
YES
Replace the inverter PC board.
Replace the fuse F4U.
NO
Replace outdoor unit PC board (A1P).
NO
Operation ready lamp (H2P) is blinking.
YES
Lamp does not go off for 12 minutes or more.
YES
Push and hold the RESET button on the outdoor unit PC board for 5 seconds.
NO
Is AHU - outdoor and outdoor - outdoor unit transmission wiring normal?
NO
Fix the AHU/outdoor unit transmission wiring.
YES
Replace the outdoor unit PC board (A1P).
(V3187)

* Check No.3 : Refer to information on P.226.

3.42 "U5" Malfunction of Transmission between remote control and AHU

Remote control Display

U5

Applicable Models

All AHU models

Method of Malfunction Detection

In case of controlling with 2-remote control, check the system using microcomputer is signal transmission between AHU and remote control (main and sub) is normal.

Malfunction Decision Conditions

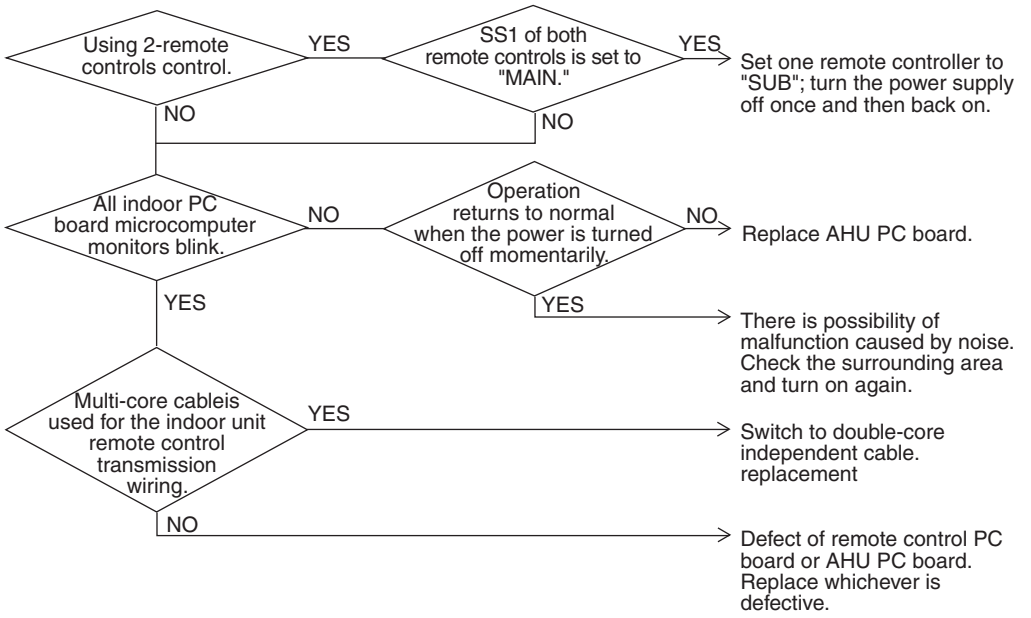
Normal transmission does not continue for specified period.

Supposed Causes

- Malfunction of AHU remote control transmission
- Connection of two main remote controls (when using 2 remote controls)
- Defect of AHU PC board
- Defect of remote control PC board
- Malfunction of transmission caused by noise

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Using 2-remote controls control.
YES
SS1 of both remote controls is set to "MAIN."
YES
Set one remote controller to "SUB"; turn the power supply off once and then back on.
NO
NO
All indoor PC board microcomputer monitors blink.
NO
Operation returns to normal when the power is turned off momentarily.
NO
Replace AHU PC board.
YES
YES
There is possibility of malfunction caused by noise. Check the surrounding area and turn on again.
Multi-core cableis used for the indoor unit remote control transmission wiring.
YES
Switch to double-core independent cable. replacement
NO
Defect of remote control PC board or AHU PC board. Replace whichever is defective.

(V2823)

3.43 "UA" Excessive Number of AHUs

remote control Display

UA

Applicable Models

All AHU models

Method of Malfunction Detection

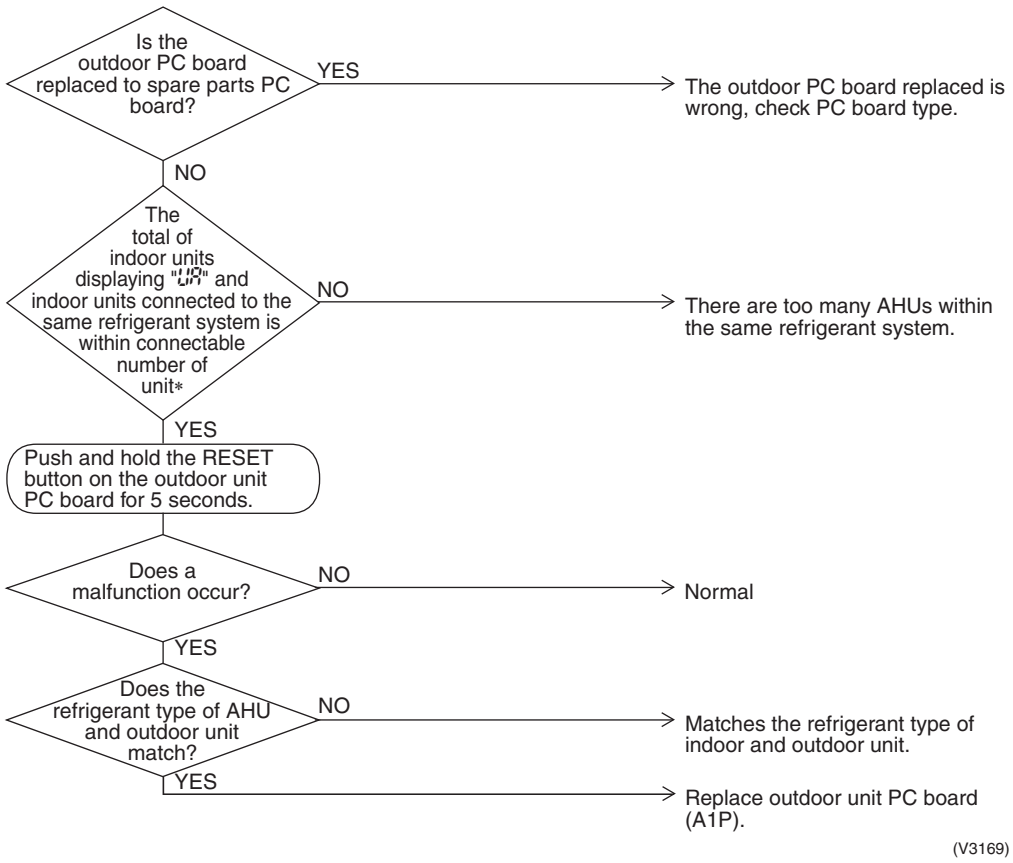
Malfunction Decision Conditions

Supposed Causes

- Excess of connected AHUs
- Defect of outdoor unit PC board (A1P)
- Mismatching of the refrigerant type of AHU and outdoor unit.
- Setting of outdoor PC board was not conducted after replacing to spare parts PC board.

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the outdoor PC board replaced to spare parts PC board?
YES
The outdoor PC board replaced is wrong, check PC board type.
NO
The total of indoor units displaying "UA" and indoor units connected to the same refrigerant system is within connectable number of unit*
NO
There are too many AHUs within the same refrigerant system.
YES
Push and hold the RESET button on the outdoor unit PC board for 5 seconds.
Does a malfunction occur?
NO
Normal
YES
Does the refrigerant type of AHU and outdoor unit match?
NO
Matches the refrigerant type of indoor and outdoor unit.
YES
Replace outdoor unit PC board (A1P).
(V3169)

* The number of AHUs that can be connected to a single outdoor unit system depends on the type of outdoor unit.

3.44 "UF" System is not Set yet

remote control Display

UF

Applicable Models

All models of AHUs
RXYSQ4~6PA

Method of Malfunction Detection

On check operation, the number of AHUs in terms of transmission is not corresponding to that of AHUs that have made changes in temperature.

Malfunction Decision Conditions

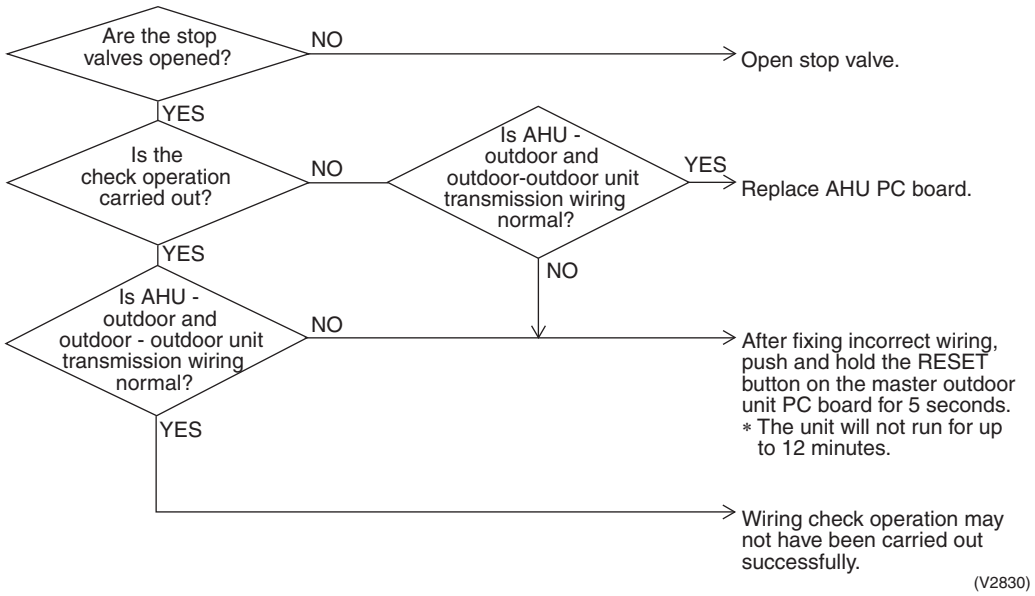
The malfunction is determined as soon as the abnormality aforementioned is detected through checking the system for any erroneous connection of units on the check operation.

Supposed Causes

- Improper connection of transmission wiring between AHUs-outdoor units and outdoor-outdoor units
- Failure to execute check operation
- Defect of AHU PC board
- Stop valve is left in closed

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Are the stop valves opened?
NO
Open stop valve.
YES
Is the check operation carried out?
NO
Is AHU - outdoor and outdoor-outdoor unit transmission wiring normal?
YES
Replace AHU PC board.
YES
NO
Is AHU - outdoor and outdoor - outdoor unit transmission wiring normal?
NO
After fixing incorrect wiring, push and hold the RESET button on the master outdoor unit PC board for 5 seconds.
* The unit will not run for up to 12 minutes.
YES
Wiring check operation may not have been carried out successfully.
(V2830)

Note: Wiring check operation may not be successful if carried out after the outdoor unit has been off for more than 12 hours, or if it is not carried out after running all connected AHUs in the fan mode for at least an hour.

3.45 "UH" Malfunction of System, Refrigerant System Address Undefined

remote control Display

UH

Applicable Models

AII AHU models
RXYSQ4~6PA

Method of Malfunction Detection

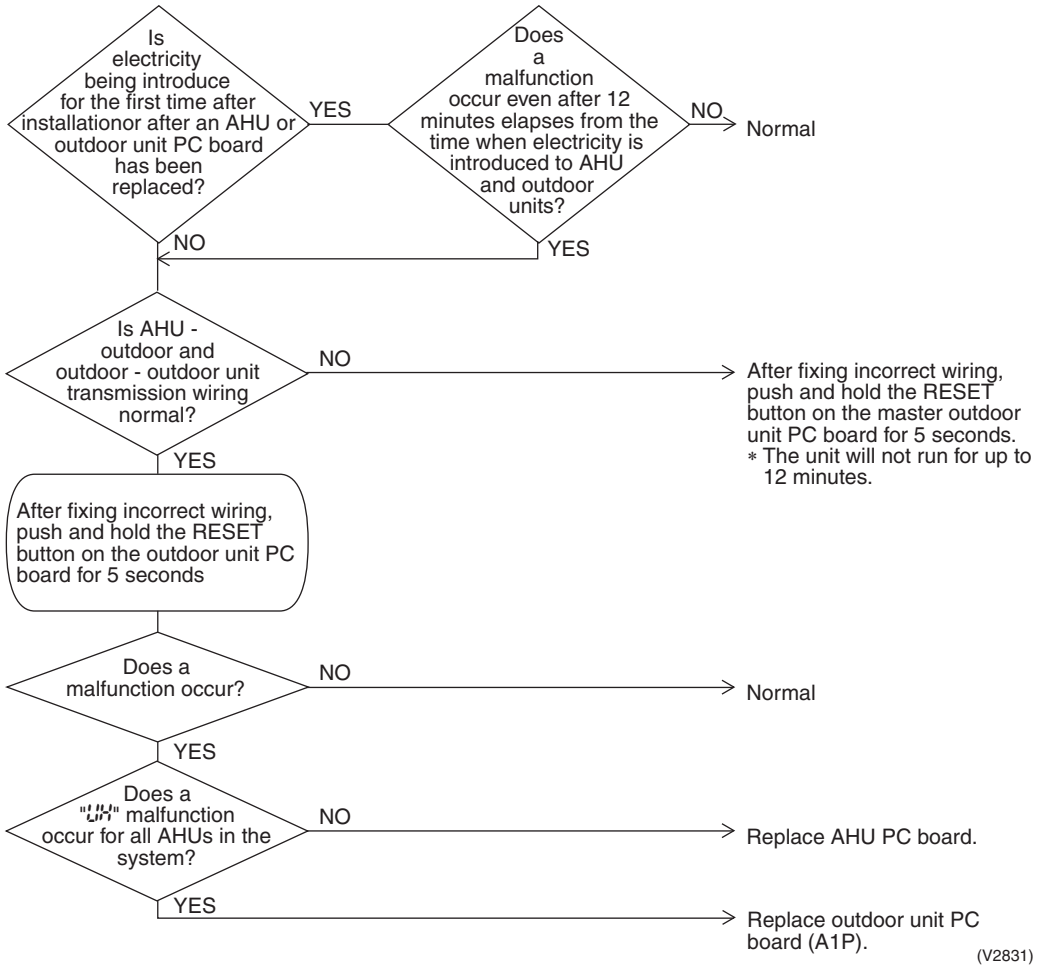
Malfunction Decision Conditions

Supposed Causes

- Improper connection of transmission wiring between outdoor unit and outdoor unit outside control adapter
- Defect of AHU PC board
- Defect of outdoor unit PC board (A1P)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is electricity being introduce for the first time after installationor after an AHU or outdoor unit PC board has been replaced?
YES
Does a malfunction occur even after 12 minutes elapses from the time when electricity is introduced to AHU and outdoor units?
NO
Normal
NO
YES
Is AHU - outdoor and outdoor - outdoor unit transmission wiring normal?
NO
After fixing incorrect wiring, push and hold the RESET button on the master outdoor unit PC board for 5 seconds.
∗ The unit will not run for up to 12 minutes.
YES
After fixing incorrect wiring, push and hold the RESET button on the outdoor unit PC board for 5 seconds
Does a malfunction occur?
NO
Normal
YES
Does a "UH" malfunction occur for all AHUs in the system?
NO
Replace AHU PC board.
YES
Replace outdoor unit PC board (A1P).
(V2831)

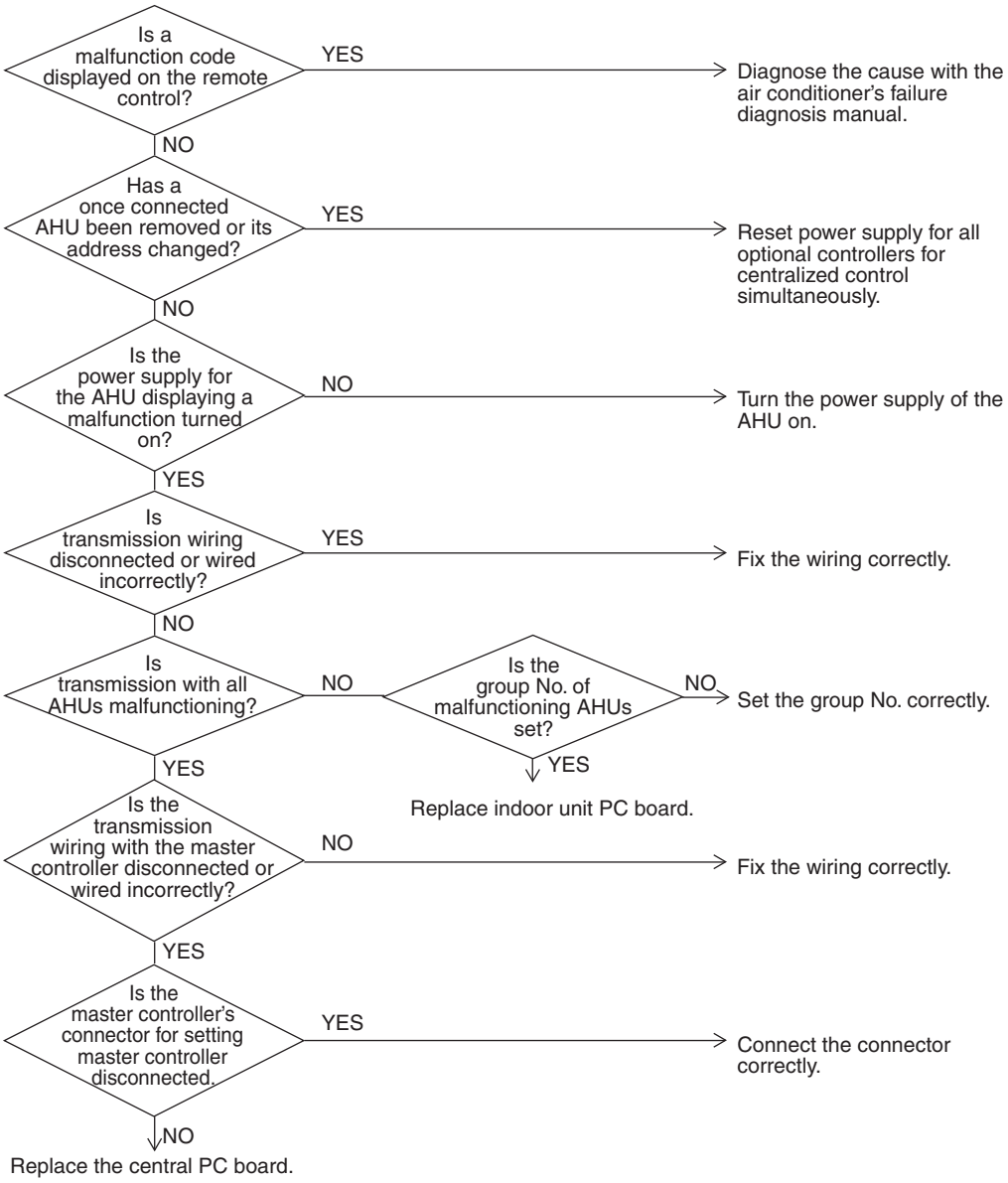
4. Troubleshooting by Indication on the Unified ON/OFF Controller

4.1 Operation Lamp Blinks

remote control Display	Operation lamp blinks
Applicable Models	All models of AHUs Unified ON/OFF controller
Method of Malfunction Detection	
Malfunction Decision Conditions	
Supposed Causes	■ Malfunction of transmission between optional controller and AHU ■ Connector for setting master controller is disconnected ■ Defect of unified ON/OFF controller ■ Defect of AHU PC board ■ Malfunction of air conditioner

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is a malfunction code displayed on the remote control?
YES
Diagnose the cause with the air conditioner's failure diagnosis manual.
NO
Has a once connected AHU been removed or its address changed?
YES
Reset power supply for all optional controllers for centralized control simultaneously.
NO
Is the power supply for the AHU displaying a malfunction turned on?
NO
Turn the power supply of the AHU on.
YES
Is transmission wiring disconnected or wired incorrectly?
YES
Fix the wiring correctly.
NO
Is transmission with all AHUs malfunctioning?
NO
Is the group No. of malfunctioning AHUs set?
NO
Set the group No. correctly.
YES
YES
Replace indoor unit PC board.
Is the transmission wiring with the master controller disconnected or wired incorrectly?
NO
Fix the wiring correctly.
YES
Is the master controller's connector for setting master controller disconnected.
YES
Connect the connector correctly.
NO
Replace the central PC board.

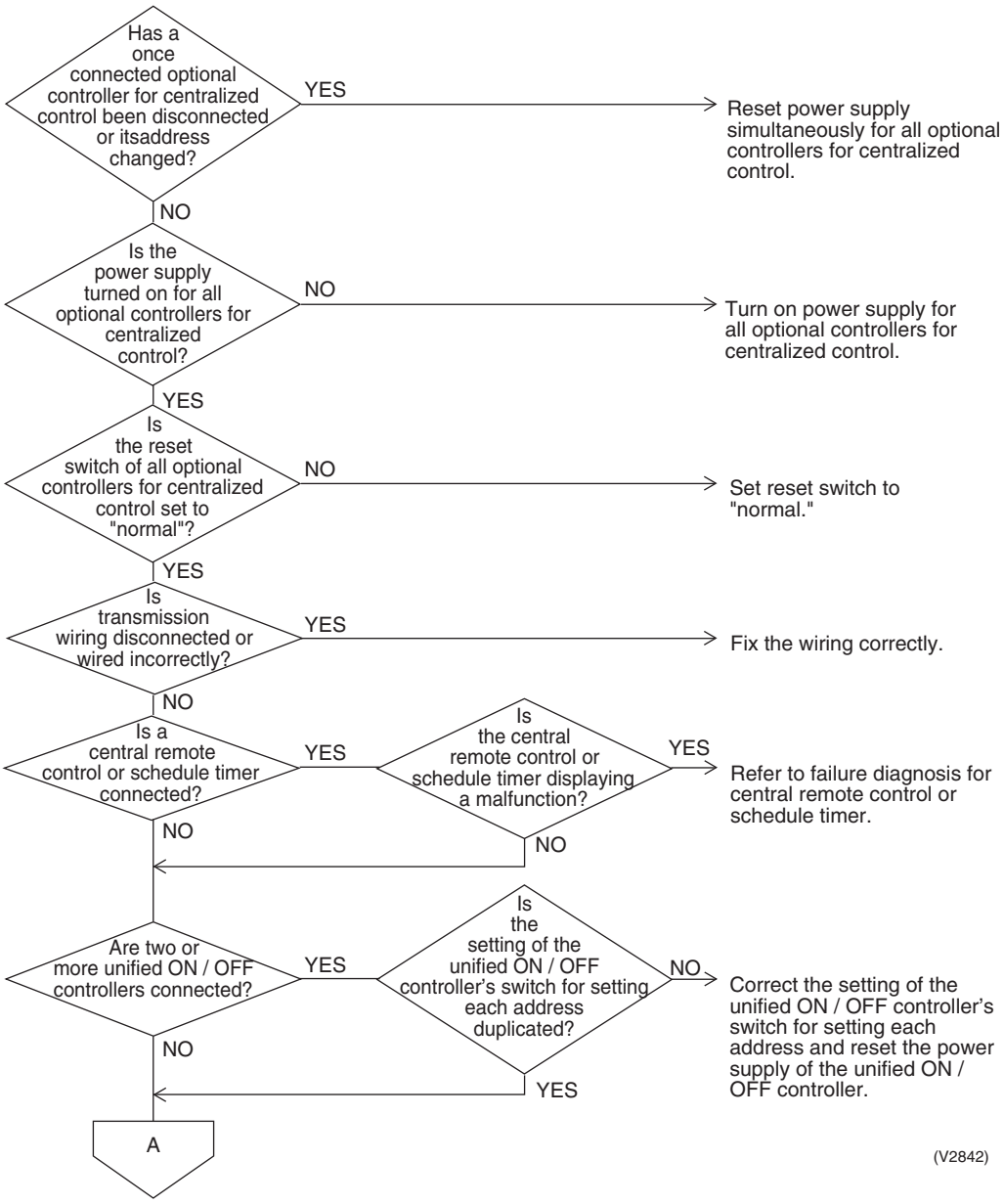
(V2841)

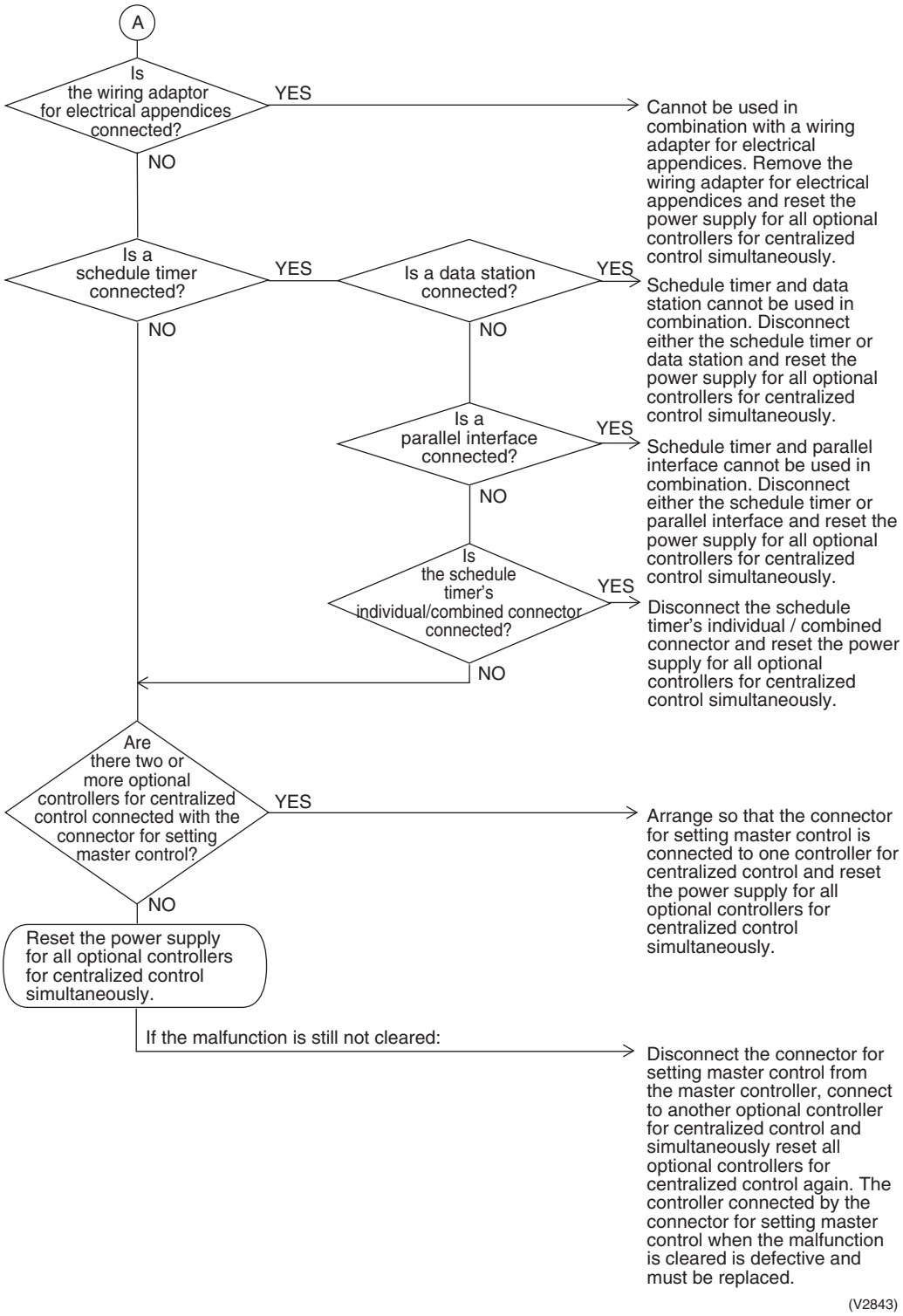
4.2 Display “Under Host Computer Integrate Control” Blinks (Repeats Single Blink)

remote control Display	“under host computer integrated control” (Repeats single blink)
Applicable Models	Unified ON/OFF controller Central controller, Schedule timer
Method of Malfunction Detection	
Malfunction Decision Conditions	
Supposed Causes	■ Address duplication of central remote control ■ Improper combination of optional controllers for centralized control ■ Connection of more than one master controller ■ Malfunction of transmission between optional controllers for centralized control ■ Defect of PC board of optional controllers for centralized control

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Has a once connected optional controller for centralized control been disconnected or itsaddress changed?
YES
Reset power supply simultaneously for all optional controllers for centralized control.
NO
Is the power supply turned on for all optional controllers for centralized control?
NO
Turn on power supply for all optional controllers for centralized control.
YES
Is the reset switch of all optional controllers for centralized control set to "normal"?
NO
Set reset switch to "normal."
YES
Is transmission wiring disconnected or wired incorrectly?
YES
Fix the wiring correctly.
NO
Is a central remote control or schedule timer connected?
YES
Is the central remote control or schedule timer displaying a malfunction?
YES
Refer to failure diagnosis for central remote control or schedule timer.
NO
NO
Are two or more unified ON / OFF controllers connected?
YES
Is the setting of the unified ON / OFF controller's switch for setting each address duplicated?
NO
Correct the setting of the unified ON / OFF controller's switch for setting each address and reset the power supply of the unified ON / OFF controller.
NO
YES
A
(V2842)


A
Is the wiring adaptor for electrical appendices connected?
YES
Cannot be used in combination with a wiring adapter for electrical appendices. Remove the wiring adapter for electrical appendices and reset the power supply for all optional controllers for centralized control simultaneously.
NO
Is a schedule timer connected?
YES
Is a data station connected?
YES
Schedule timer and data station cannot be used in combination. Disconnect either the schedule timer or data station and reset the power supply for all optional controllers for centralized control simultaneously.
NO
NO
Is a parallel interface connected?
YES
Schedule timer and parallel interface cannot be used in combination. Disconnect either the schedule timer or parallel interface and reset the power supply for all optional controllers for centralized control simultaneously.
NO
Is the schedule timer's individual/combined connector connected?
YES
Disconnect the schedule timer's individual / combined connector and reset the power supply for all optional controllers for centralized control simultaneously.
NO
Are there two or more optional controllers for centralized control connected with the connector for setting master control?
YES
Arrange so that the connector for setting master control is connected to one controller for centralized control and reset the power supply for all optional controllers for centralized control simultaneously.
NO
Reset the power supply for all optional controllers for centralized control simultaneously.
If the malfunction is still not cleared:
Disconnect the connector for setting master control from the master controller, connect to another optional controller for centralized control and simultaneously reset all optional controllers for centralized control again. The controller connected by the connector for setting master control when the malfunction is cleared is defective and must be replaced.
(V2843)

4.3 Display “Under Host Computer Integrate Control” Blinks (Repeats Double Blink)

remote control Display

“under host computer integrated control” (Repeats double blink)

Applicable Models

Unified ON/OFF controller

Method of Malfunction Detection

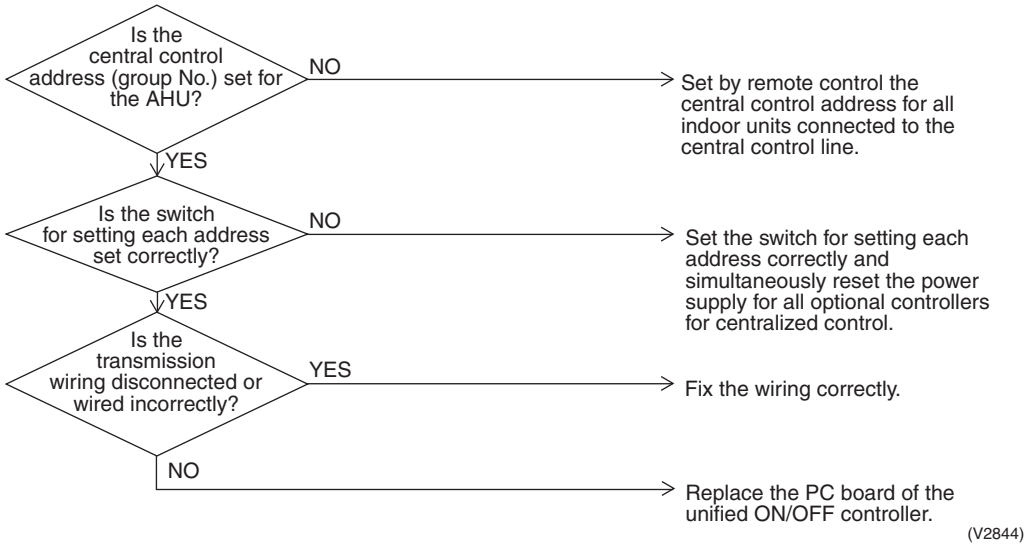
Malfunction Decision Conditions

Supposed Causes

- Central control address (group No.) is not set for AHU.
- Improper address setting
- Improper wiring of transmission wiring

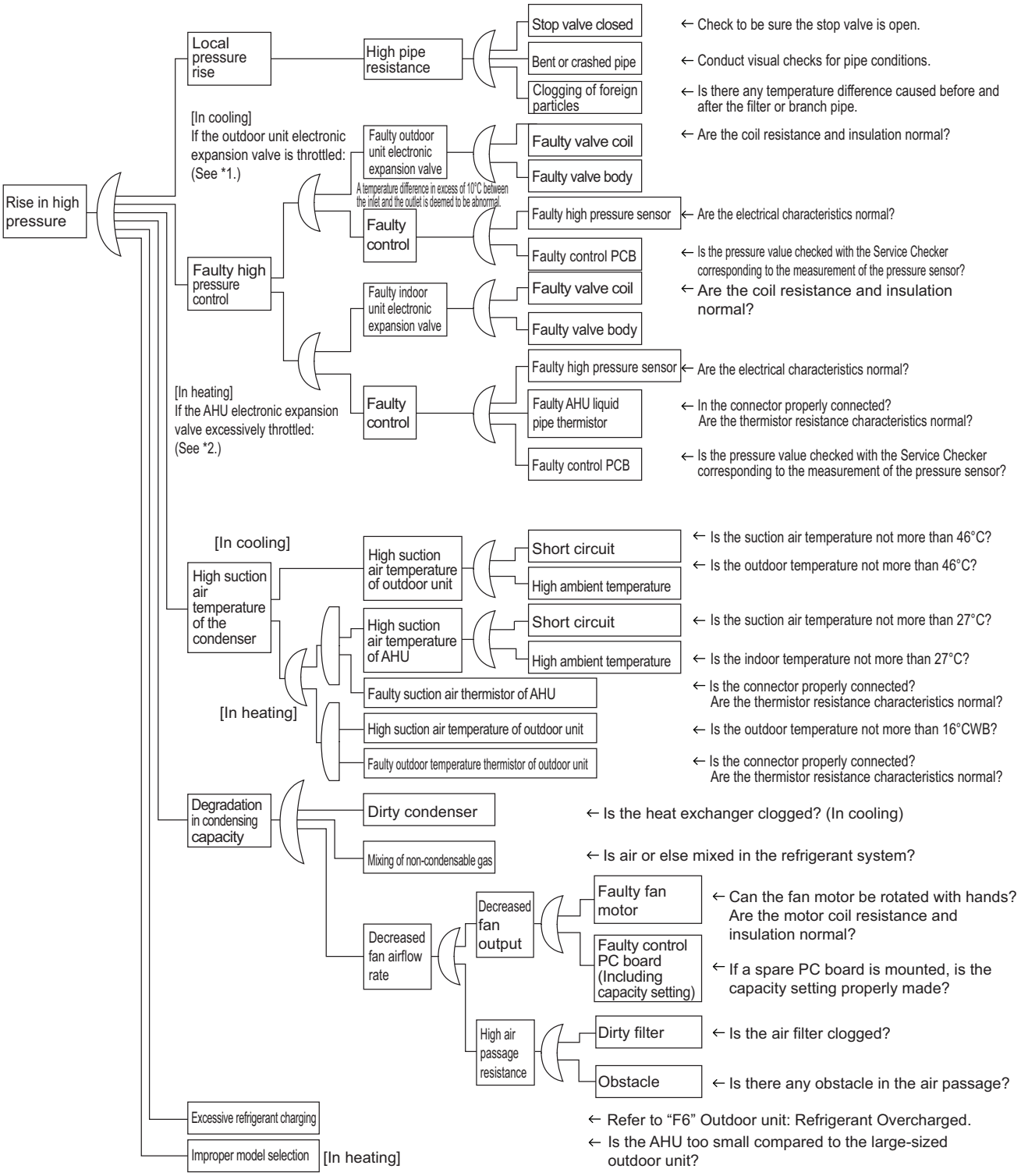
Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.


Is the central control address (group No.) set for the AHU?
NO
Set by remote control the central control address for all indoor units connected to the central control line.
YES
Is the switch for setting each address set correctly?
NO
Set the switch for setting each address correctly and simultaneously reset the power supply for all optional controllers for centralized control.
YES
Is the transmission wiring disconnected or wired incorrectly?
YES
Fix the wiring correctly.
NO
Replace the PC board of the unified ON/OFF controller.
(V2844)

[CHECK 1] Check for causes of rise in high pressure

Referring to the Fault Tree Analysis (FTA) shown below, probe the faulty points.

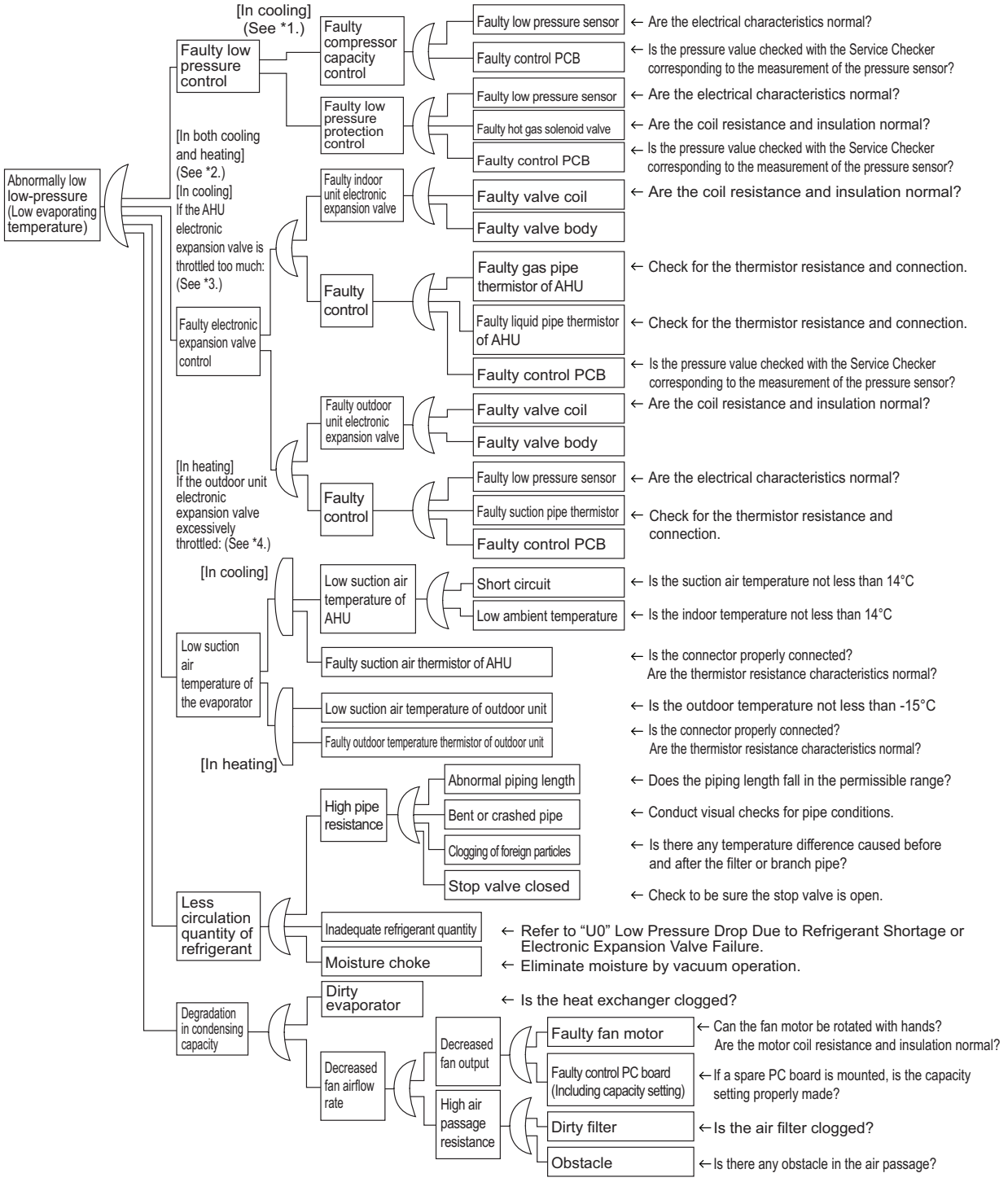

Rise in high pressure
Local pressure rise
High pipe resistance
Stop valve closed
← Check to be sure the stop valve is open.
Bent or crashed pipe
← Conduct visual checks for pipe conditions.
Clogging of foreign particles
← Is there any temperature difference caused before and after the filter or branch pipe.
[In cooling]
If the outdoor unit electronic expansion valve is throttled:
(See *1.)
Faulty outdoor unit electronic expansion valve
Faulty valve coil
Faulty valve body
← Are the coil resistance and insulation normal?
A temperature difference in excess of 10°C between the inlet and the outlet is deemed to be abnormal.
Faulty control
Faulty high pressure sensor
← Are the electrical characteristics normal?
Faulty control PCB
← Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
Faulty high pressure control
Faulty indoor unit electronic expansion valve
Faulty valve coil
Faulty valve body
← Are the coil resistance and insulation normal?
Faulty high pressure sensor
← Are the electrical characteristics normal?
[In heating]
If the AHU electronic expansion valve excessively throttled:
(See *2.)
Faulty control
Faulty AHU liquid pipe thermistor
← In the connector properly connected?
Are the thermistor resistance characteristics normal?
Faulty control PCB
← Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
[In cooling]
High suction air temperature of the condenser
High suction air temperature of outdoor unit
Short circuit
← Is the suction air temperature not more than 46°C?
High ambient temperature
← Is the outdoor temperature not more than 46°C?
High suction air temperature of AHU
Short circuit
← Is the suction air temperature not more than 27°C?
High ambient temperature
← Is the indoor temperature not more than 27°C?
[In heating]
Faulty suction air thermistor of AHU
← Is the connector properly connected?
Are the thermistor resistance characteristics normal?
High suction air temperature of outdoor unit
← Is the outdoor temperature not more than 16°CWB?
Faulty outdoor temperature thermistor of outdoor unit
← Is the connector properly connected?
Are the thermistor resistance characteristics normal?
Degradation in condensing capacity
Dirty condenser
← Is the heat exchanger clogged? (In cooling)
Mixing of non-condensable gas
← Is air or else mixed in the refrigerant system?
Decreased fan airflow rate
Decreased fan output
Faulty fan motor
← Can the fan motor be rotated with hands?
Are the motor coil resistance and insulation normal?
Faulty control PC board (Including capacity setting)
← If a spare PC board is mounted, is the capacity setting properly made?
High air passage resistance
Dirty filter
← Is the air filter clogged?
Obstacle
← Is there any obstacle in the air passage?
Excessive refrigerant charging
← Refer to “F6” Outdoor unit: Refrigerant Overcharged.
Improper model selection
[In heating]
← Is the AHU too small compared to the large-sized outdoor unit?

*1: In cooling, it is normal if the outdoor unit electronic expansion valve (EV1) is fully open.
*2: In heating, the AHU electronic expansion valve is used for “subcooled degree control”.

C: SDK04009

[CHECK 2] Check for causes of drop in low pressure

Referring to the Fault Tree Analysis (FTA) shown below, probe the faulty points.


Abnormally low low-pressure (Low evaporating temperature)
[In cooling] (See *1.)
Faulty low pressure control
Faulty compressor capacity control
Faulty low pressure sensor
← Are the electrical characteristics normal?
Faulty control PCB
← Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
Faulty low pressure protection control
Faulty low pressure sensor
← Are the electrical characteristics normal?
Faulty hot gas solenoid valve
← Are the coil resistance and insulation normal?
Faulty control PCB
← Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
[In both cooling and heating] (See *2.)
[In cooling] If the AHU electronic expansion valve is throttled too much: (See *3.)
Faulty indoor unit electronic expansion valve
Faulty valve coil
← Are the coil resistance and insulation normal?
Faulty valve body
Faulty control
Faulty gas pipe thermistor of AHU
← Check for the thermistor resistance and connection.
Faulty liquid pipe thermistor of AHU
← Check for the thermistor resistance and connection.
Faulty control PCB
← Is the pressure value checked with the Service Checker corresponding to the measurement of the pressure sensor?
Faulty electronic expansion valve control
Faulty outdoor unit electronic expansion valve
Faulty valve coil
← Are the coil resistance and insulation normal?
Faulty valve body
[In heating] If the outdoor unit electronic expansion valve excessively throttled: (See *4.)
Faulty control
Faulty low pressure sensor
← Are the electrical characteristics normal?
Faulty suction pipe thermistor
← Check for the thermistor resistance and connection.
Faulty control PCB
[In cooling]
Low suction air temperature of AHU
Short circuit
← Is the suction air temperature not less than 14°C
Low ambient temperature
← Is the indoor temperature not less than 14°C
Low suction air temperature of the evaporator
Faulty suction air thermistor of AHU
← Is the connector properly connected? Are the thermistor resistance characteristics normal?
[In heating]
Low suction air temperature of outdoor unit
← Is the outdoor temperature not less than -15°C
Faulty outdoor temperature thermistor of outdoor unit
← Is the connector properly connected? Are the thermistor resistance characteristics normal?
High pipe resistance
Abnormal piping length
← Does the piping length fall in the permissible range?
Bent or crashed pipe
← Conduct visual checks for pipe conditions.
Clogging of foreign particles
← Is there any temperature difference caused before and after the filter or branch pipe?
Stop valve closed
← Check to be sure the stop valve is open.
Less circulation quantity of refrigerant
Inadequate refrigerant quantity
← Refer to "U0" Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure.
Moisture choke
← Eliminate moisture by vacuum operation.
Degradation in condensing capacity
Dirty evaporator
← Is the heat exchanger clogged?
Decreased fan airflow rate
Decreased fan output
Faulty fan motor
← Can the fan motor be rotated with hands? Are the motor coil resistance and insulation normal?
Faulty control PC board (Including capacity setting)
← If a spare PC board is mounted, is the capacity setting properly made?
High air passage resistance
Dirty filter
← Is the air filter clogged?
Obstacle
← Is there any obstacle in the air passage?

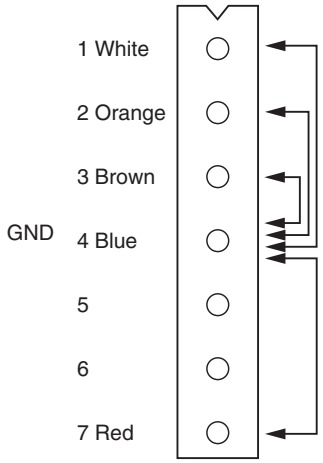
*1: For details of the compressor capacity control while in cooling, refer to "Compressor PI Control".
*2: The "low pressure protection control" includes low pressure protection control and hot gas bypass control. For details, refer to "Low Pressure Protection Control".
*3: In cooling, the AHU electronic expansion valve is used for "superheated degree control".
*4: In heating, the outdoor unit electronic expansion valve (EV1) is used for "superheated degree control of outdoor unit heat exchanger".

C: SDK04009

[CHECK 3] Check for Fan Motor Connector

(1) Turn the power supply off.

(2) With the fan motor connector on motor side disconnected, measure the resistance between each pin, then make sure that the resistance is more than the value mentioned in the following table.



Measurement point	Judgment
1 - 4	1MΩ or more
2 - 4	100kΩ or more
3 - 4	100Ω or more
4 - 7	100kΩ or more

Part 10
Appendix

1. Piping Diagrams 228
   1.1 Outdoor Unit 228
2. Wiring Diagrams 229
   2.1 Outdoor Unit 229
   2.2 Field Wiring 230
3. Option List 231
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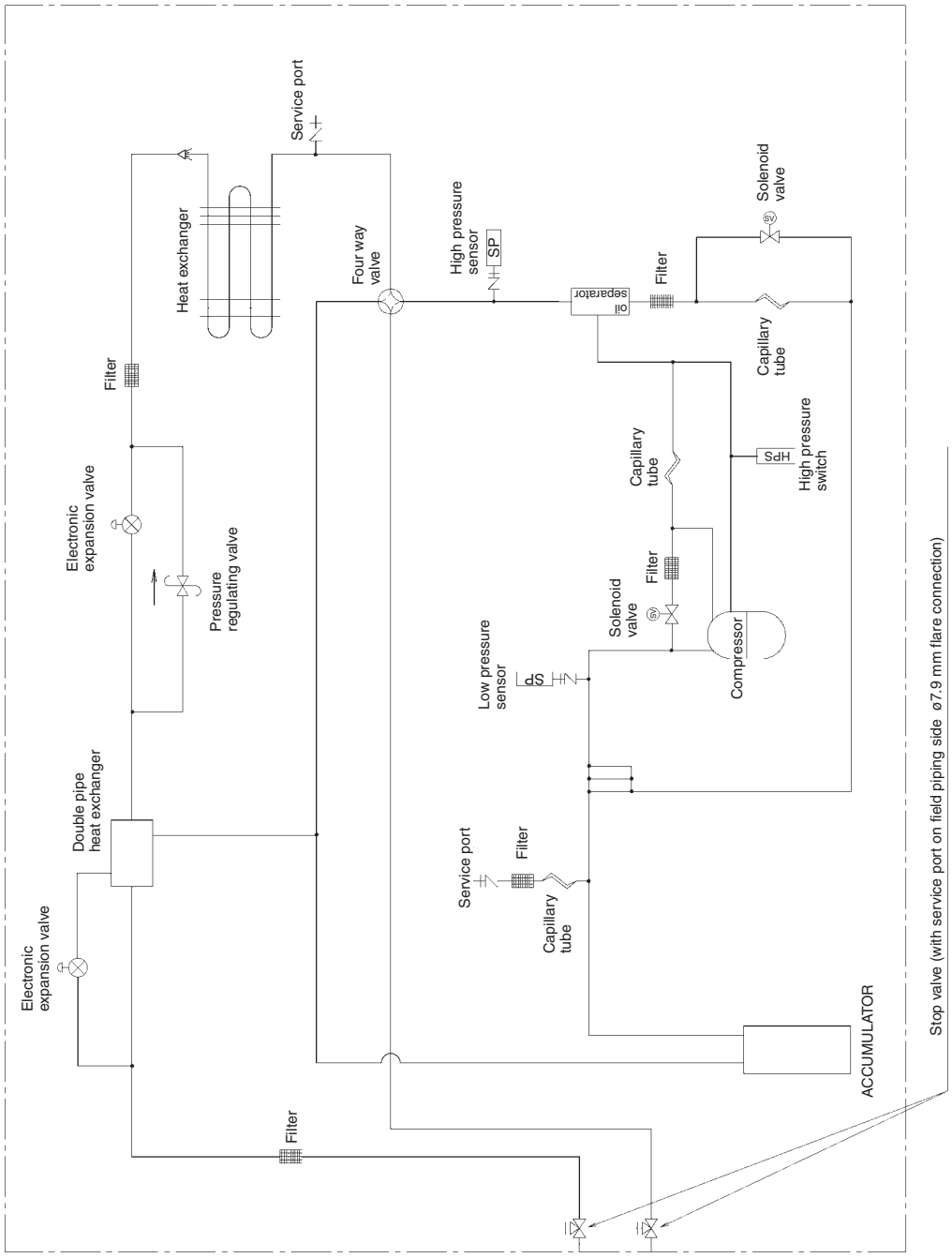
5. Pressure Sensor 234
6. Method of Replacing the Inverter's Power Transistors Modules 235

1. Piping Diagrams

1.1 Outdoor Unit

ERQ 100/125/140 A7V1B

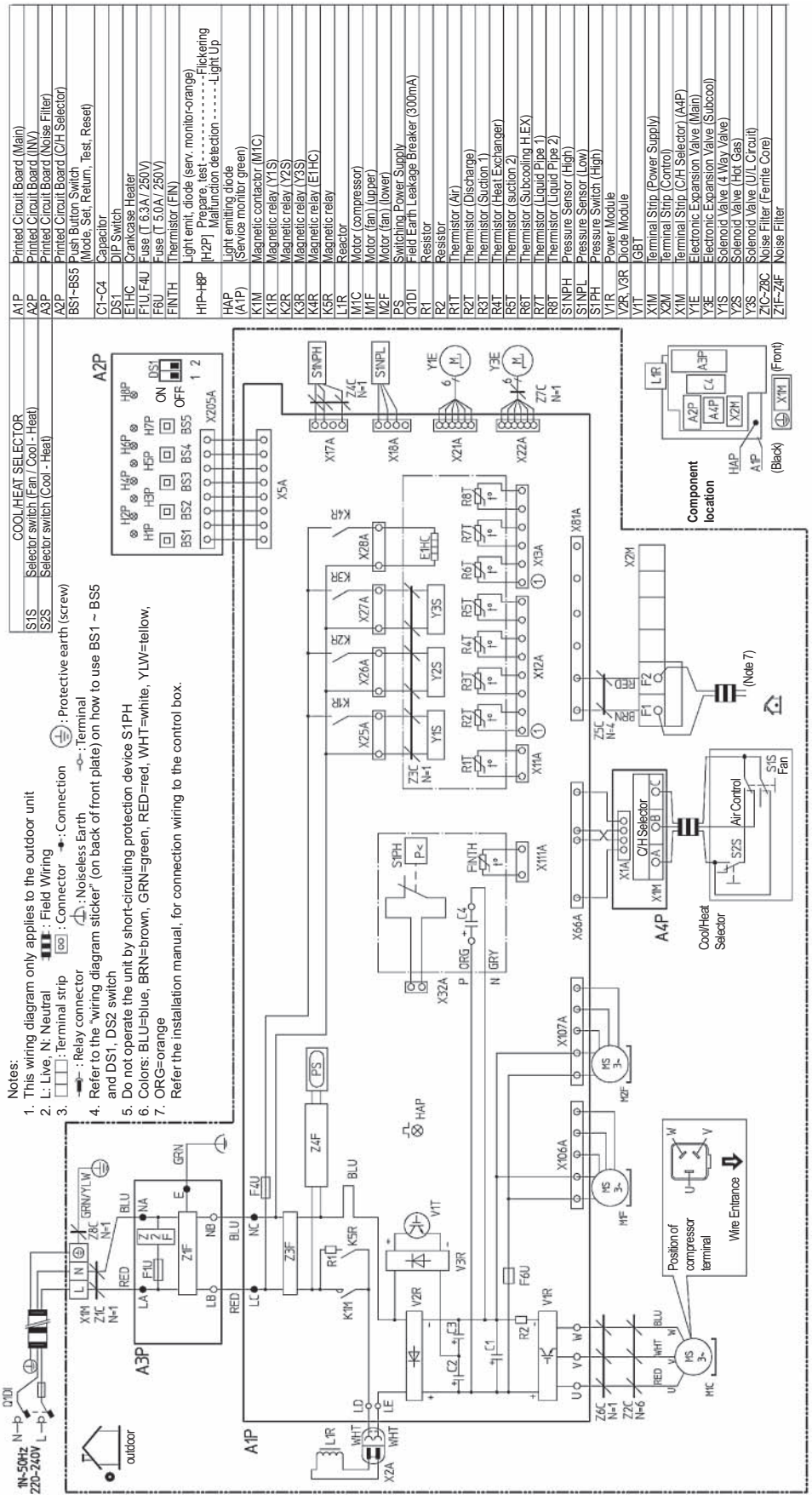
3D052712



2. Wiring Diagrams

2.1 Outdoor Unit

ERQ 100/125/140 A7V1B

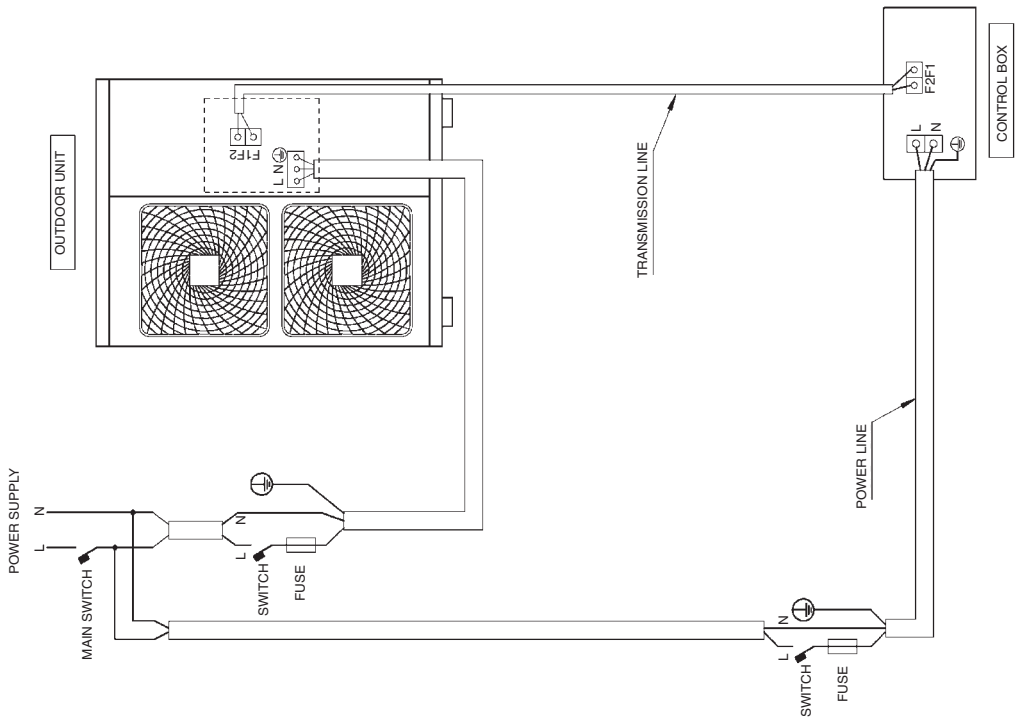

A1P Printed Circuit Board (Main)
A2P Printed Circuit Board (INV)
A3P Printed Circuit Board (Noise Filter)
A4P Printed Circuit Board (C/H Selector)
BS1~BS5 Push Button Switch (Mode, Set, Return, Test, Reset)
C1~C4 Capacitor
DS1 DIP Switch
E1HC Crankcase Heater
F1U,F4U Fuse (T 6.3A / 250V)
F6U Fuse (T 5.0A / 250V)
FINTH Thermistor (FIN)
H1P~H8P Light emit. diode (serv. monitor-orange) [H2P] Prepare, test ----------Flickering Malfunction detection -----Light Up
HAP (A1P) Light emitting diode (Service monitor green)
K1M Magnetic contactor (M1C)
K1R Magnetic relay (Y1S)
K2R Magnetic relay (Y2S)
K3R Magnetic relay (Y3S)
K4R Magnetic relay (E1HC)
K5R Magnetic relay
L1R Reactor
M1C Motor (compressor)
M1F Motor (fan) (upper)
M2F Motor (fan) (lower)
PS Switching Power Supply
Q1DI Field Earth Leakage Breaker (300mA)
R1 Resistor
R2 Resistor
R1T Thermistor (Air)
R2T Thermistor (Discharge)
R3T Thermistor (Suction 1)
R4T Thermistor (Heat Exchanger)
R5T Thermistor (Suction 2)
R6T Thermistor (Subcooling H.EX)
R7T Thermistor (Liquid Pipe 1)
R8T Thermistor (Liquid Pipe 2)
S1NPH Pressure Sensor (High)
S1NPL Pressure Sensor (Low)
S1PH Pressure Switch (High)
V1R Power Module
V2R,V3R Diode Module
V1T IGBT
X1M Terminal Strip (Power Supply)
X2M Terminal Strip (Control)
X1M Terminal Strip (C/H Selector) (A4P)
Y1E Electronic Expansion Valve (Main)
Y3E Electronic Expansion Valve (Subcool)
Y1S Solenoid Valve (4 Way Valve)
Y2S Solenoid Valve (Hot Gas)
Y3S Solenoid Valve (U/L Circuit)
Z1C~Z8C Noise Filter (Ferrite Core)
Z1F~Z4F Noise Filter
S1S Selector switch (Fan / Cool - Heat)
S2S Selector switch (Cool - Heat)
COOL/HEAT SELECTOR
Notes:
1. This wiring diagram only applies to the outdoor unit
2. L: Live, N: Neutral
3. : Terminal strip : Field Wiring : Connector : Connection : Protective earth (screw)
4. : Relay connector : Noiseless Earth : Terminal
Refer to the "wiring diagram sticker" (on back of front plate) on how to use BS1 ~ BS5 and DS1, DS2 switch
5. Do not operate the unit by short-circuiting protection device S1PH
6. Colors: BLU=blue, BRN=brown, GRN=green, RED=red, WHT=white, YLW=tellow,
7. ORG=orange
Refer the installation manual, for connection wiring to the control box.
1N~50Hz 220~240V
outdoor
A1P
A2P
A3P
A4P
Component location
Cool/Heat Selector
Air Control
C/H Selector
Position of compressor terminal
Wire Entrance
(Note 7)
(Black)
(Front)

2.2 Field Wiring

ERQ 100/125/140 A7V1B

NOTES:

1. ALL WIRING, COMPONENTS AND MATERIALS TO BE PROCURED ON THE SITE MUST COMPLY WITH THE APPLICABLE LOCAL AND NATIONAL CODES.
2. USE COPPER CONDUCTORS ONLY.
3. FOR DETAILS, SEE WIRING DIAGRAM.
4. INSTALL A CIRCUIT BREAKER FOR SAFETY.
5. ALL FIELD WIRING AND COMPONENTS MUST BE PROVIDED BY A LICENCED ELECTRICIAN.
6. UNIT SHALL BE GROUNDED IN COMPLIANCE WITH THE APPLICABLE LOCAL AND NATIONAL CODES.
7. WIRING SHOWN ARE GENERAL POINTS-OF-CONNECTION GUIDES ONLY AND ARE NOT INTENDED FOR OR TO INCLUDE ALL DETAILS FOR A SPECIFIC INSTALLATION.
8. BE SURE TO INSTALL THE SWITCH AND THE FUSE TO THE POWER LINE OF EACH EQUIPMENT.
9. INSTALL THE MAIN SWITCH THAT CAN INTERRUPT ALL THE POWER SOURCES IN AN INTEGRATED MANNER BECAUSE THIS SYSTEM CONSISTS OF THE EQUIPMENT UTILIZING THE MULTIPLE POWER SOURCES.
10. FOR DETAILED CONTROL BOX SIDE CONNECTION, SEE CONTROL BOX MANUAL AND WIRING DIAGRAM.



3. Option List

ERQA7V1B

No	Item	Type		
		ERQ100	ERQ125	ERQ140
1	Cool/Heat Selector	KRC19-26A6		
2	Fixing Box	KJB111A		
3	Central drain plug	KKPJ5F180		

Notes : All options are kits.

4. Thermistor Resistance / Temperature Characteristics

AHU	For air suction	R1T
	For liquid pipe	R2T
	For gas pipe	R3T
Outdoor unit	For outdoor air	R1T
	For suction pipe 1	R3T
	For heat exchanger	R4T, R6T
	For suction pipe 2	R5T
	For Subcooling heat exchanger outlet	R6T, R4T
	For Liquid pipe	R7T, R8T

Outdoor unit for fin thermistor R1T

(kΩ)

T°C	0.0
-10	-
-8	-
-6	88.0
-4	79.1
-2	71.1
0	64.1
2	57.8
4	52.3
6	47.3
8	42.9
10	38.9
12	35.3
14	32.1
16	29.2
18	26.6
20	24.3
22	22.2
24	20.3
26	18.5
28	17.0
30	15.6
32	14.2
34	13.1
36	12.0
38	11.1
40	10.3
42	9.5
44	8.8
46	8.2
48	7.6
50	7.0
52	6.7
54	6.0
56	5.5
58	5.2
60	4.79
62	4.46
64	4.15
66	3.87
68	3.61
70	3.37
72	3.15
74	2.94
76	2.75
78	2.51
80	2.41
82	2.26
84	2.12
86	1.99
88	1.87
90	1.76
92	1.65
94	1.55
96	1.46
98	1.38

T°C	0.0	0.5
-20	197.81	192.08
-19	186.53	181.16
-18	175.97	170.94
-17	166.07	161.36
-16	156.80	152.38
-15	148.10	143.96
-14	139.94	136.05
-13	132.28	128.63
-12	125.09	121.66
-11	118.34	115.12
-10	111.99	108.96
-9	106.03	103.18
-8	100.41	97.73
-7	95.14	92.61
-6	90.17	87.79
-5	85.49	83.25
-4	81.08	78.97
-3	76.93	74.94
-2	73.01	71.14
-1	69.32	67.56
0	65.84	64.17
1	62.54	60.96
2	59.43	57.94
3	56.49	55.08
4	53.71	52.38
5	51.09	49.83
6	48.61	47.42
7	46.26	45.14
8	44.05	42.98
9	41.95	40.94
10	39.96	39.01
11	38.08	37.18
12	36.30	35.45
13	34.62	33.81
14	33.02	32.25
15	31.50	30.77
16	30.06	29.37
17	28.70	28.05
18	27.41	26.78
19	26.18	25.59
20	25.01	24.45
21	23.91	23.37
22	22.85	22.35
23	21.85	21.37
24	20.90	20.45
25	20.00	19.56
26	19.14	18.73
27	18.32	17.93
28	17.54	17.17
29	16.80	16.45
30	16.10	15.76

T°C	0.0	0.5
30	16.10	15.76
31	15.43	15.10
32	14.79	14.48
33	14.18	13.88
34	13.59	13.31
35	13.04	12.77
36	12.51	12.25
37	12.01	11.76
38	11.52	11.29
39	11.06	10.84
40	10.63	10.41
41	10.21	10.00
42	9.81	9.61
43	9.42	9.24
44	9.06	8.88
45	8.71	8.54
46	8.37	8.21
47	8.05	7.90
48	7.75	7.60
49	7.46	7.31
50	7.18	7.04
51	6.91	6.78
52	6.65	6.53
53	6.41	6.53
54	6.65	6.53
55	6.41	6.53
56	6.18	6.06
57	5.95	5.84
58	5.74	5.43
59	5.14	5.05
60	4.96	4.87
61	4.79	4.70
62	4.62	4.54
63	4.46	4.38
64	4.30	4.23
65	4.16	4.08
66	4.01	3.94
67	3.88	3.81
68	3.75	3.68
69	3.62	3.56
70	3.50	3.44
71	3.38	3.32
72	3.27	3.21
73	3.16	3.11
74	3.06	3.01
75	2.96	2.91
76	2.86	2.82
77	2.77	2.72
78	2.68	2.64
79	2.60	2.55
80	2.51	2.47

Outdoor Unit Thermistors for Discharge Pipe (R2T)

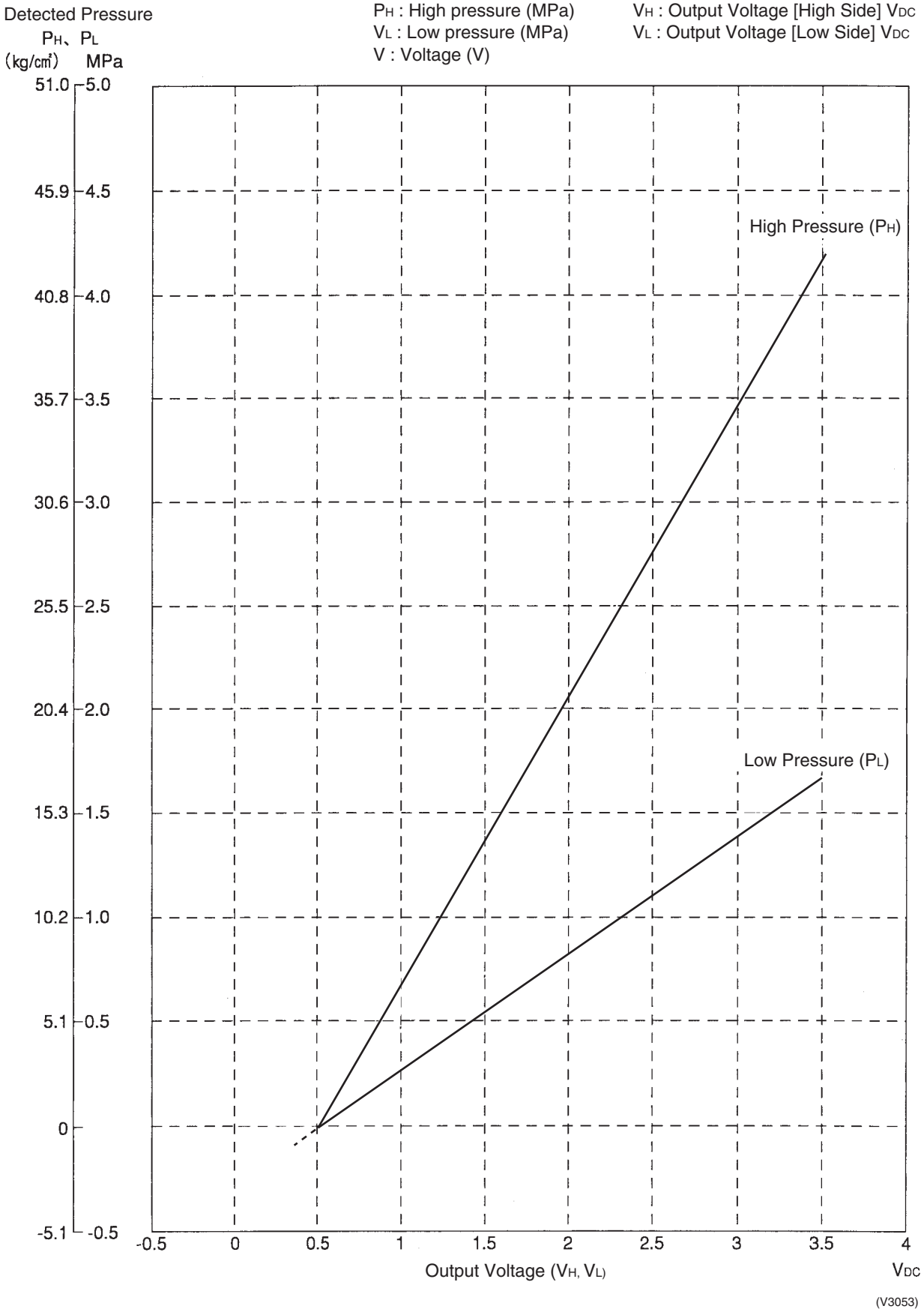
(kΩ)

T°C	0.0	0.5	T°C	0.0	0.5	T°C	0.0	0.5
0	640.44	624.65	50	72.32	70.96	100	13.35	13.15
1	609.31	594.43	51	69.64	68.34	101	12.95	12.76
2	579.96	565.78	52	67.06	65.82	102	12.57	12.38
3	552.00	538.63	53	64.60	63.41	103	12.20	12.01
4	525.63	512.97	54	62.24	61.09	104	11.84	11.66
5	500.66	488.67	55	59.97	58.87	105	11.49	11.32
6	477.01	465.65	56	57.80	56.75	106	11.15	10.99
7	454.60	443.84	57	55.72	54.70	107	10.83	10.67
8	433.37	423.17	58	53.72	52.84	108	10.52	10.36
9	413.24	403.57	59	51.98	50.96	109	10.21	10.06
10	394.16	384.98	60	49.96	49.06	110	9.92	9.78
11	376.05	367.35	61	48.19	47.33	111	9.64	9.50
12	358.88	350.62	62	46.49	45.67	112	9.36	9.23
13	342.58	334.74	63	44.86	44.07	113	9.10	8.97
14	327.10	319.66	64	43.30	42.54	114	8.84	8.71
15	312.41	305.33	65	41.79	41.06	115	8.59	8.47
16	298.45	291.73	66	40.35	39.65	116	8.35	8.23
17	285.18	278.80	67	38.96	38.29	117	8.12	8.01
18	272.58	266.51	68	37.63	36.98	118	7.89	7.78
19	260.60	254.72	69	36.34	35.72	119	7.68	7.57
20	249.00	243.61	70	35.11	34.51	120	7.47	7.36
21	238.36	233.14	71	33.92	33.35	121	7.26	7.16
22	228.05	223.08	72	32.78	32.23	122	7.06	6.97
23	218.24	213.51	73	31.69	31.15	123	6.87	6.78
24	208.90	204.39	74	30.63	30.12	124	6.69	6.59
25	200.00	195.71	75	29.61	29.12	125	6.51	6.42
26	191.53	187.44	76	28.64	28.16	126	6.33	6.25
27	183.46	179.57	77	27.69	27.24	127	6.16	6.08
28	175.77	172.06	78	26.79	26.35	128	6.00	5.92
29	168.44	164.90	79	25.91	25.49	129	5.84	5.76
30	161.45	158.08	80	25.07	24.66	130	5.69	5.61
31	154.79	151.57	81	24.26	23.87	131	5.54	5.46
32	148.43	145.37	82	23.48	23.10	132	5.39	5.32
33	142.37	139.44	83	22.73	22.36	133	5.25	5.18
34	136.59	133.79	84	22.01	21.65	134	5.12	5.05
35	131.06	128.39	85	21.31	20.97	135	4.98	4.92
36	125.79	123.24	86	20.63	20.31	136	4.86	4.79
37	120.76	118.32	87	19.98	19.67	137	4.73	4.67
38	115.95	113.62	88	19.36	19.05	138	4.61	4.55
39	111.35	109.13	89	18.75	18.46	139	4.49	4.44
40	106.96	104.84	90	18.17	17.89	140	4.38	4.32
41	102.76	100.73	91	17.61	17.34	141	4.27	4.22
42	98.75	96.81	92	17.07	16.80	142	4.16	4.11
43	94.92	93.06	93	16.54	16.29	143	4.06	4.01
44	91.25	89.47	94	16.04	15.79	144	3.96	3.91
45	87.74	86.04	95	15.55	15.31	145	3.86	3.81
46	84.38	82.75	96	15.08	14.85	146	3.76	3.72
47	81.16	79.61	97	14.62	14.40	147	3.67	3.62
48	78.09	76.60	98	14.18	13.97	148	3.58	3.54
49	75.14	73.71	99	13.76	13.55	149	3.49	3.45
50	72.32	70.96	100	13.35	13.15	150	3.41	3.37

5. Pressure Sensor

$P_H = 1.38V-0.69$
$P_L = 0.57V-0.28$
P_H : High pressure (MPa)
V_L : Low pressure (MPa)
V : Voltage (V)

P_H : Detected Pressure [High Side] MPa
P_L : Detected Pressure [Low Side] MPa
V_H : Output Voltage [High Side] V_{DC}
V_L : Output Voltage [Low Side] V_{DC}



6. Method of Replacing the Inverter's Power Transistors Modules

Checking failures in power semiconductors mounted on inverter PC board

Check the power semiconductors mounted on the inverter PC board by the use of a multiple tester.

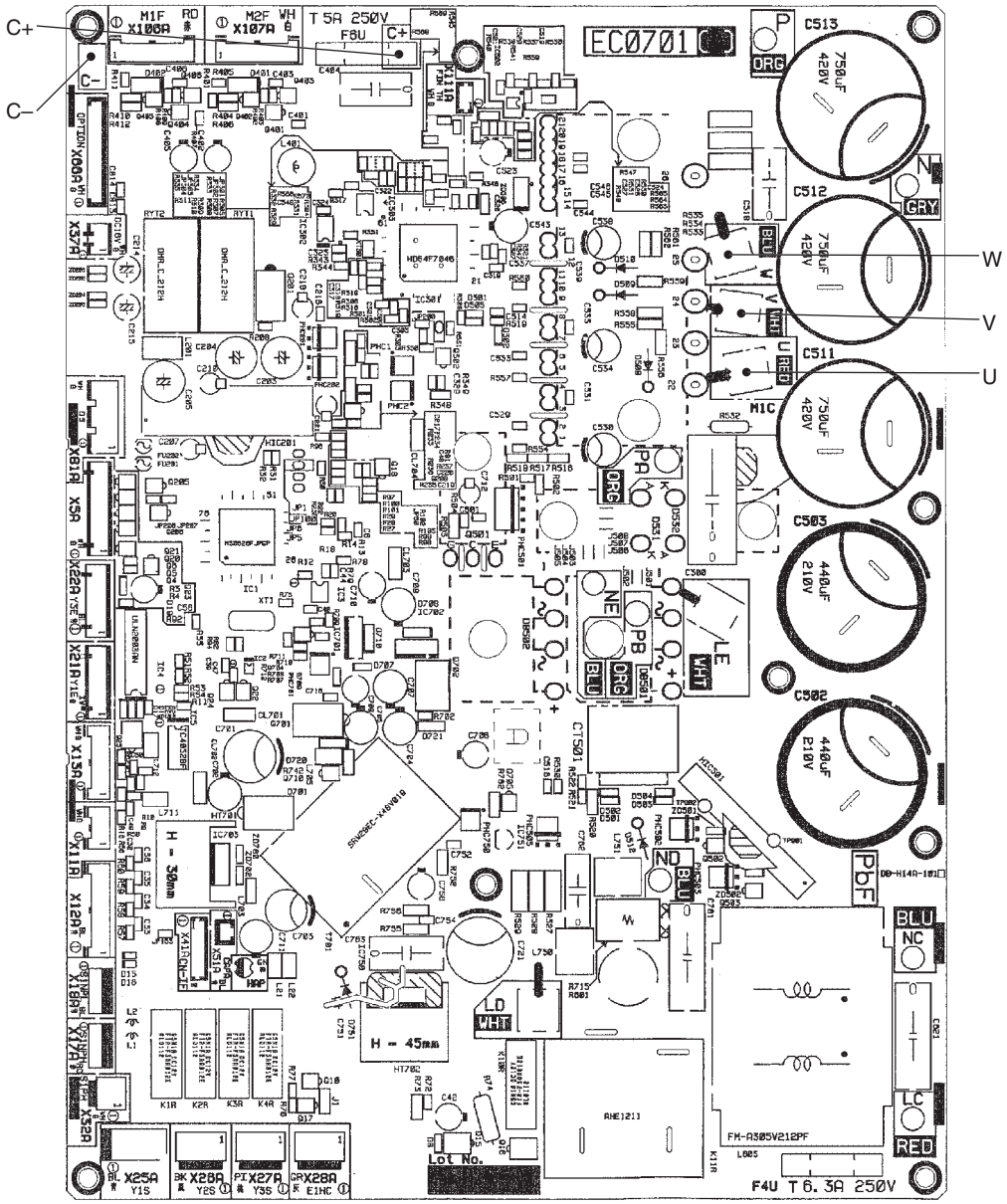
<Items to be prepared>

- Multiple tester : Prepare the digital type of multiple tester with diode check function.

<Preparation>

- Turn OFF the power supply. Then, after a lapse of 10 minutes or more, make measurement of resistance.
- To make measurement, disconnect all connectors and terminals.

ERQ 100/125/140 A7V1B



Power module checking

When using the digital type of multiple tester, make measurement in diode check mode.

Tester terminal		Criterion	Remark
+	-		
C+	U	Not less than 0.3V (including ∞)*	It may take time to determine the voltage due to capacitor charge or else.
	V		
	W		
U	C-	Not less than 0.3V (including ∞)*	
V			
W			
U	C+	0.3 to 0.7V (including ∞)*	
V			
W			
C-	U	0.3 to 0.7V (including ∞)*	
	V		
	W		

*There needs to be none of each value variation.

The following abnormalities are also doubted besides the PC board abnormality.

- Faulty compressor (ground fault, ground leakage)
- Faulty fan motor (ground leakage)

Part 11 Precautions for New Refrigerant (R-410A)

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1. Precautions for New Refrigerant (R-410A)

1.1 Outline

1.1.1 About Refrigerant R-410A

■ Characteristics of new refrigerant, R-410A

1. Performance
   Almost the same performance as R-22 and R-407C
2. Pressure
   Working pressure is approx. 1.4 times more than R-22 and R-407C.
3. Refrigerant composition
   Few problems in composition control, since it is a Quasi-azeotropic mixture refrigerant.

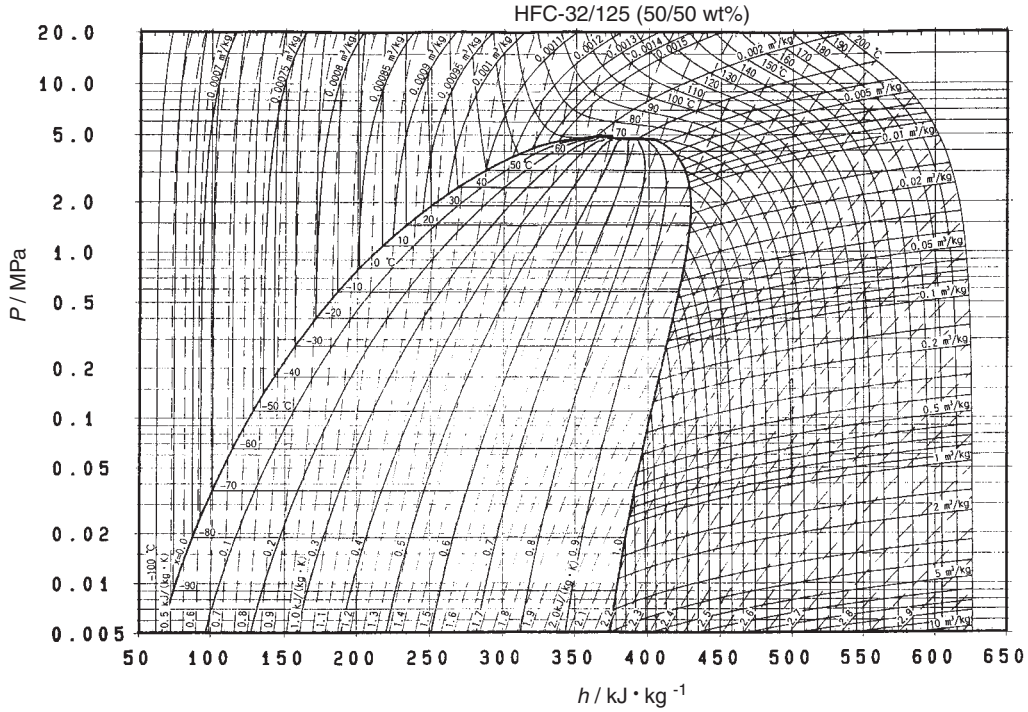
	HFC units (Units using new refrigerants)		HCFC units
Refrigerant name	R-407C	R-410A	R-22
Composing substances	Non-azeotropic mixture of HFC32, HFC125 and HFC134a (*1)	Quasi-azeotropic mixture of HFC32 and JFC125 (*1)	Single-component refrigerant
Design pressure	3.2 MPa (gauge pressure) = 32.6 kgf/cm^2	4.0 MPa (gauge pressure) = 40.8 kgf/cm^2	2.75MPa (gauge pressure) = 28.0 kgf/cm^2
Refrigerant oil	Synthetic oil (Ether)		Mineral oil (Suniso)
Ozone destruction factor (ODP)	0	0	0.05
Combustibility	None	None	None
Toxicity	None	None	None

★1. Non-azeotropic mixture refrigerant: mixture of two or more refrigerants having different boiling points.

★2. Quasi-azeotropic mixture refrigerant: mixture of two or more refrigerants having similar boiling points.

★3. The design pressure is different at each product. Please refer to the installation manual for each product.

(Reference) 1 MPa ≒ 10.19716 kgf / cm^2



Pressure-Enthalpy curves of HFC-32/125 (50/50 wt%)

■ Thermodynamic characteristic of R-410A

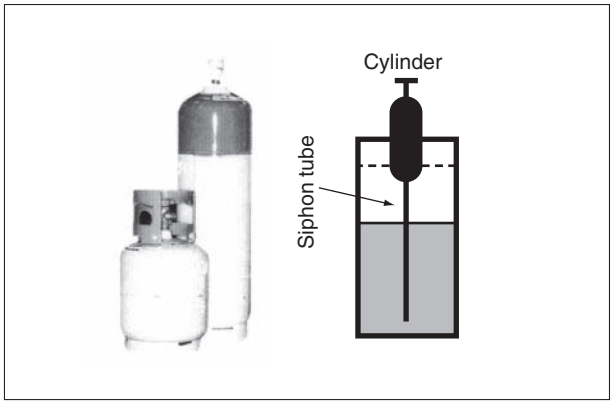
DAIREP ver2.0

Temperature (°C)	Steam pressure (kPa)		Density (kg/m³)		Specific heat at constant pressure (kJ/kgK)		Specific enthalpy (kJ/kg)		Specific entropy (kJ/KgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
-70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
-68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
-66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
-64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
-62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
-60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
-58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
-56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
-54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
-52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
-51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
-50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
-48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
-46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
-44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
-42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
-40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
-38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
-36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
-34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
-32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
-30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
-28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
-26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
-24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
-22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
-20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
-18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
-16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
-14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
-12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
-10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.014	1.906
-8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
-6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
-4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
-2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

1.2 Refrigerant Cylinders

■ Cylinder specifications

- The cylinder is painted refrigerant color (pink).
- The cylinder valve is equipped with a siphon tube.



Refrigerant can be charged in liquid state with cylinder in upright position.

Caution: Do not lay cylinder on its side during charging, since it cause refrigerant in gas state to enter the system.

■ Handling of cylinders

(1) Laws and regulations

R-410A is liquefied gas, and the High-Pressure Gas Safety Law must be observed in handling them. Before using, refer to the High-Pressure Gas Safety Law.
The Law stipulates standards and regulations that must be followed to prevent accidents with high-pressure gases. Be sure to follow the regulations.

(2) Handing of vessels

Since R-410A is high-pressure gas, it is contained in high-pressure vessels.
Although those vessels are durable and strong, careless handling can cause damage that can lead to unexpected accidents. Do not drop vessels, let them fall, apply impact or roll them on the ground.

(3) Storage

Although R-410A is not flammable, it must be stored in a well-ventilated, cool, and dark place in the same way as any other high-pressure gases.
It should also be noted that high-pressure vessels are equipped with safety devices that releases gas when the ambient temperature reaches more than a certain level (fusible plug melts) and when the pressure exceeds a certain level (spring-type safety valve operates).

1.3 Service Tools

R-410A is used under higher working pressure, compared to previous refrigerants (R-22,R-407C). Furthermore, the refrigerating machine oil has been changed from Suniso oil to Ether oil, and if oil mixing is occurred, sludge results in the refrigerants and causes other problems. Therefore, gauge manifolds and charge hoses that are used with a previous refrigerant (R-22,R-407C) can not be used for products that use new refrigerants.
Be sure to use dedicated tools and devices.

■ Tool compatibility

Tool	Compatibility			Reasons for change
	HFC		HCFC	
	R-410A	R-407C	R-22	
Gauge manifold Charge hose	×			■ Do not use the same tools for R-22 and R-410A. ■ Thread specification differs for R-410A and R-407C.
Charging cylinder	×		○	■ Weighting instrument used for HFCs.
Gas detector	○		×	■ The same tool can be used for HFCs.
Vacuum pump (pump with reverse flow preventive function)	○			■ To use existing pump for HFCs, vacuum pump adapter must be installed.
Weighting instrument	○			
Charge mouthpiece	×			■ Seal material is different between R-22 and HFCs. ■ Thread specification is different between R-410A and others.
Flaring tool (Clutch type)	○			■ For R-410A, flare gauge is necessary.
Torque wrench	○			■ Torque-up for 1/2 and 5/8
Pipe cutter	○			
Pipe expander	○			
Pipe bender	○			
Pipe assembling oil	×			■ Due to refrigerating machine oil change. (No Suniso oil can be used.)
Refrigerant recovery device	Check your recovery device.			
Refrigerant piping	See the chart below.			■ Only ϕ19.1 is changed to 1/2H material while the previous material is "O".

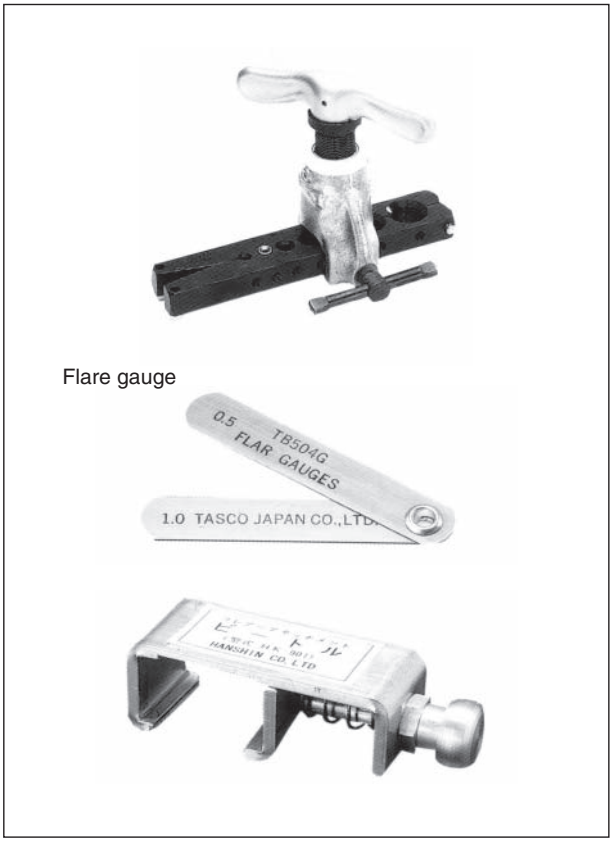
As for the charge mouthpiece and packing, 1/2UNF20 is necessary for mouthpiece size of charge hose.

■ Copper tube material and thickness

Pipe size	R-407C		R-410A	
	Material	Thickness t (mm)	Material	Thickness t (mm)
ϕ6.4	O	0.8	O	0.8
ϕ9.5	O	0.8	O	0.8
ϕ12.7	O	0.8	O	0.8
ϕ15.9	O	1.0	O	1.0
ϕ19.1	O	1.0	1/2H	1.0
ϕ22.2	1/2H	1.0	1/2H	1.0
ϕ25.4	1/2H	1.0	1/2H	1.0
ϕ28.6	1/2H	1.0	1/2H	1.0
ϕ31.8	1/2H	1.2	1/2H	1.1
ϕ38.1	1/2H	1.4	1/2H	1.4
ϕ44.5	1/2H	1.6	1/2H	1.6

* O: Soft (Annealed)
H: Hard (Drawn)

1. Flaring tool



■ Specifications

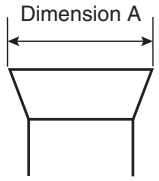
• Dimension A

Unit:mm

Nominal size	Tube O.D.	$A^{+0}_{-0.4}$	
	Do	Class-2 (R-410A)	Class-1 (Conventional)
1/4	6.35	9.1	9.0
3/8	9.52	13.2	13.0
1/2	12.70	16.6	16.2
5/8	15.88	19.7	19.4
3/4	19.05	24.0	23.3

■ Differences

• Change of dimension A



For class-1: R-407C
For class-2: R-410A

Conventional flaring tools can be used when the work process is changed.
(change of work process)
Previously, a pipe extension margin of 0 to 0.5mm was provided for flaring. For R-410A air conditioners, perform pipe flaring with a pipe extension margin of 1.0 to 1.5mm.
(For clutch type only)
Conventional tool with pipe extension margin adjustment can be used.

2. Torque wrench

■ Specifications

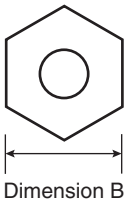
• Dimension B Unit:mm

Nominal size	Class-1	Class-2	Previous
1/2	24	26	24
5/8	27	29	27

No change in tightening torque
No change in pipes of other sizes

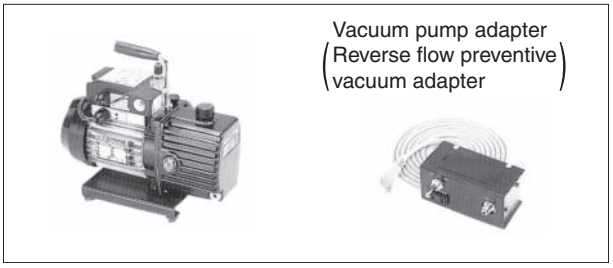
■ Differences

• Change of dimension B
Only 1/2", 5/8" are extended



For class-1: R-407C
For class-2: R-410A

3. Vacuum pump with check valve



■ Specifications

• Discharge speed
50 l/min (50Hz)
60 l/min (60Hz)

• Suction port UNF7/16-20(1/4 Flare)
UNF1/2-20(5/16 Flare) with adapter

● Maximum degree of vacuum
Select a vacuum pump which is able to keep the vacuum degree of the system in excess of –100.7 kPa (5 torr – 755 mmHg).

■ Differences

• Equipped with function to prevent reverse oil flow
• Previous vacuum pump can be used by installing adapter.

4. Leak tester

■ Specifications
- Hydrogen detecting type, etc.
- Applicable refrigerants
  R-410A, R-407C, R-404A, R-507A, R-134a, etc.

■ Differences
- Previous testers detected chlorine. Since HFCs do not contain chlorine, new tester detects hydrogen.

5. Refrigerant oil (Air compal)

■ Specifications
- Contains synthetic oil, therefore it can be used for piping work of every refrigerant cycle.
- Offers high rust resistance and stability over long period of time.

■ Differences
- Can be used for R-410A and R-22 units.

6. Gauge manifold for R-410A

■ Specifications
- High pressure gauge
  - 0.1 to 5.3 MPa (-76 cmHg to 53 kg/cm^2)
- Low pressure gauge
  - 0.1 to 3.8 MPa (-76 cmHg to 38 kg/cm^2)
- 1/4" → 5/16" (2min → 2.5min)
- No oil is used in pressure test of gauges.
  → For prevention of contamination

- Temperature scale indicates the relationship between pressure and temperature in gas saturated state.

■ Differences
- Change in pressure
- Change in service port diameter

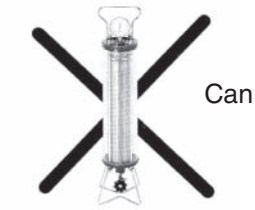
7. Charge hose for R-410A

(Hose with ball valve)

■ Specifications
- Working pressure 5.08 MPa (51.8 kg/cm^2)
- Rupture pressure 25.4 MPa (259 kg/cm^2)
- Available with and without hand-operate valve that prevents refrigerant from outflow.

■ Differences
- Pressure proof hose
- Change in service port diameter
- Use of nylon coated material for HFC resistance

8. Charging cylinder



Can not be used

■ Specifications
- Use weigher for refrigerant charge listed below to charge directly from refrigerant cylinder.

■ Differences
- The cylinder can not be used for mixed refrigerant since mixing ratio is changed during charging.

  When R-410A is charged in liquid state using charging cylinder, foaming phenomenon is generated inside charging cylinder.

9. Weigher for refrigerant charge

■ Specifications
- High accuracy
  TA101A (for 10-kg cylinder) = ± 2g
  TA101B (for 20-kg cylinder) = ± 5g
- Equipped with pressure-resistant sight glass to check liquid refrigerant charging.
- A manifold with separate ports for HFCs and previous refrigerants is equipped as standard accessories.

■ Differences
- Measurement is based on weight to prevent change of mixing ratio during charging.

10. Charge mouthpiece

■ Specifications
- For R-410A, 1/4"→ 5/16" (2min → 2.5min)
- Material is changed from CR to H-NBR.

■ Differences
- Change of thread specification on hose connection side (For the R-410A use)
- Change of sealer material for the HFCs use.

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